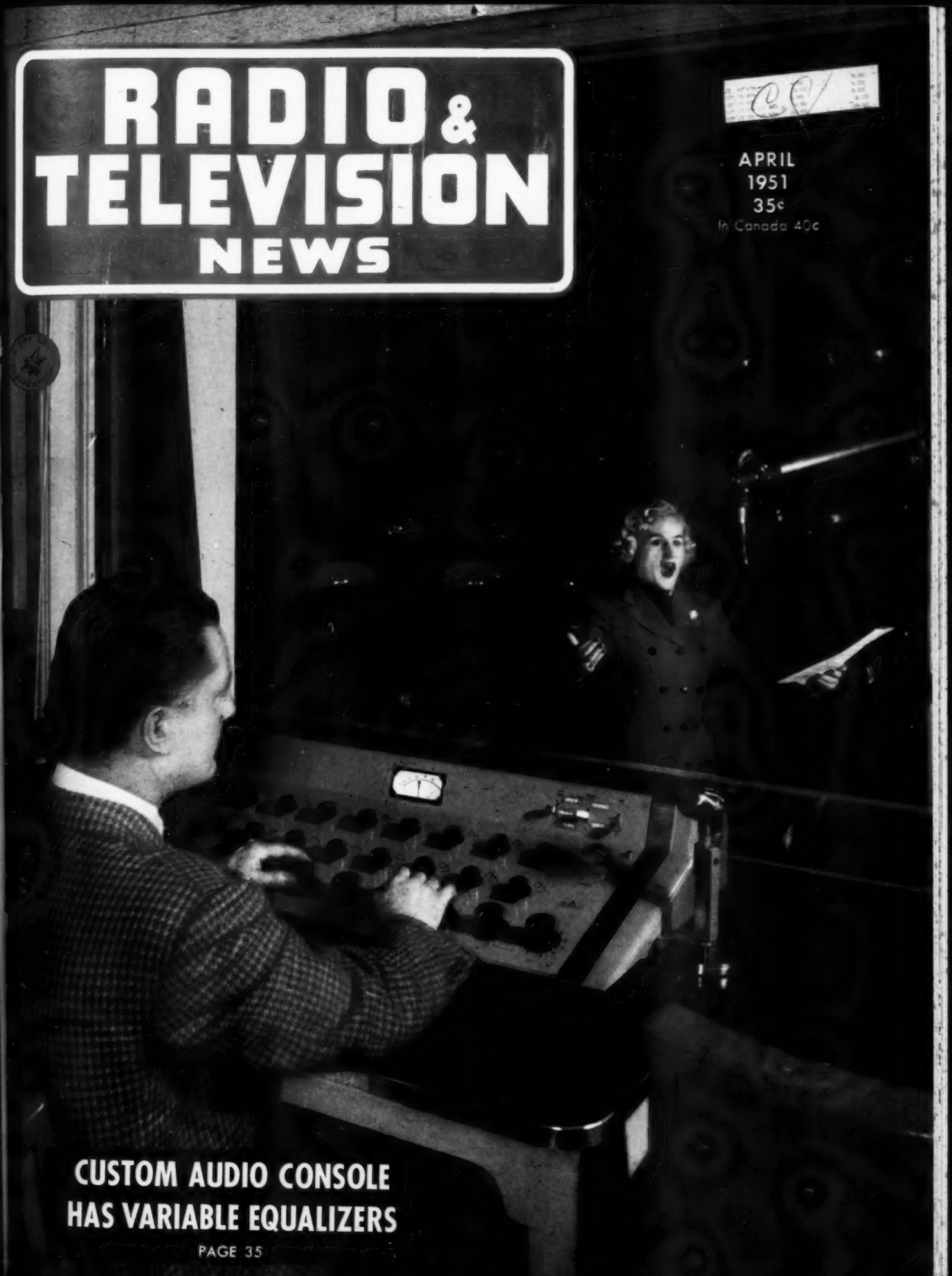
RADIO & TELEVISION NEWS

APRIL
1951
35¢
In Canada 40¢



CUSTOM AUDIO CONSOLE HAS VARIABLE EQUALIZERS

PAGE 35

THE QUALITY OF **RCA** TUBES IS UNQUESTIONED

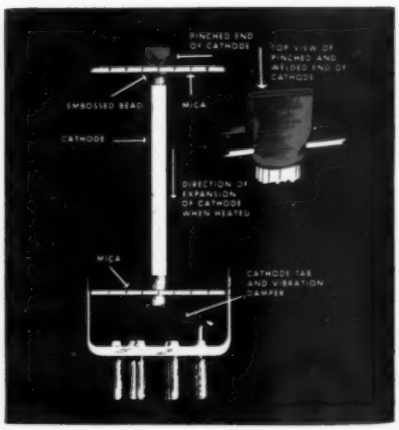
Extra Performance

as a matter of course . . . *with* RCA *tubes*

Engineering progress is part and parcel of RCA quality. For instance . . . many of the popular RCA types use *"inverted" pinched cathodes* to minimize microphonics by preventing cathode vibration or displacement.

This improved performance is achieved by clamping the top mica firmly between an embossed bead on the cathode and its pinched top end. This arrangement holds the upper end of the cathode rigidly, but permits the heated cathode to expand freely downward through the bottom mica without producing cathode strain. The lower end of the cathode is prevented from vibrating by means of the damping tab connected between the cathode and stem lead.

This example is another reason why you can count on *extra* performance and long life from RCA tubes—the quality tubes.



Keep informed—stay in touch with your RCA Tube Distributor

RADIO CORPORATION of AMERICA
ELECTRON TUBES HARRISON, N.J.

I Will Show You How to LEARN RADIO-TELEVISION SERVICING OR COMMUNICATIONS by Practicing in Spare Time

YOU PRACTICE RADIO SERVICING

You build the modern Radio shown below as part of my Servicing Course. I send you speaker, tubes, chassis, transformer, loop antenna, everything you see pictured and EVERYTHING you need to build this modern Radio Receiver. Use it to make many tests, get practical experience.

YOU PRACTICE RADIO COMMUNICATIONS

I send you all the parts to build Transmitter shown below as part of my new Communications Course. Conduct actual procedure of Broadcast Operators, practice interesting experiments, learn how to actually put a transmitter on the air.

VETERANS Get this Training under G. I. Bill **MAIL COUPON**

NEW

I TRAINED THESE MEN

"After graduating, worked for servicing shop. Now Chief Engineer of three Police Radio Stations."—S. W. DINWIDDIE, Jacksonville, Illinois.

"While learning, made $5 to $10 a week in spare time. Now have a profitable spare time shop."—L. ARNOLD, Pontiac, Mich.

"I accepted a position as Radio and Television Technician . . . was promoted to manager of Television Service and Installation."—L. HAUGER, Sun Bruno, California.

"Have my own shop. Am authorized serviceman for five manufacturers and do servicing for 7 dealers."—P. MILLER, Maumee, O.

"Four years ago, a bookkeeper on a hand-to-mouth salary, am now a Radio Engineer ABC network."—N. H. WARD, Ridgefield Park, New Jersey.

"When I enrolled, had no idea it would be so easy to learn. Have equipped my shop out of spare time earnings. I am clearing about $40 to $60 a month."—J. D. KNIGHT, Denison, Tex.

I Will Train You at Home with MANY KITS OF PARTS I SEND

Do you want good pay, a job with a bright future and security? Would you like a profitable shop of your own? The fast growing, prosperous RADIO-TELEVISION industry is making these opportunities for you. Radio alone is bigger than ever. 90 million home and auto Radios, 3100 Broadcasting Stations, expanding use of Aviation and Police Radio, Micro-Wave Relay, Two-Way Radio for buses, taxis, etc., are making opportunities for Servicing and Communications Technicians and FCC-Licensed Operators.

Television is TODAY'S Good Job Maker

In 1946 only 6,000 TV sets sold. In 1950 over 5,000,000. By 1954, 25,000,000 TV sets will be in use, according to estimates. Over 100 TV Stations are operating in 35 states. Authorities predict there will be 1,000 TV Stations. This means new jobs, more jobs, good pay for qualified men.

Many Soon Make $10 A Week Extra in Spare Time

Keep your job while training at home. Hundreds I've trained are successful RADIO-TELEVISION TECHNICIANS. Learn Radio-Television principles from illustrated lessons. Get PRACTICAL EXPERIENCE experimenting with circuits common to Radio and Television. Many students make $5, $10 a week extra fixing neighbors' Radios in spare time. Special Booklets start teaching you the day you enroll.

Send Now for 2 Books FREE—Mail Coupon

Send for my FREE DOUBLE OFFER. Get actual Servicing lesson. Also get my 64-page book, "How to Be a Success in Radio-Television." Read what my graduates are doing, earning. Send coupon in envelope or paste on postal. J. E. SMITH, President, Dept. 1DE. National Radio Institute, Washington 9. D. C. OUR 38TH YEAR.

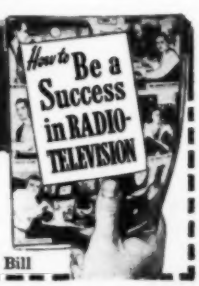
NOW! Advanced Television Practice

New, special TV kits furnished to build high-definition SCOPE . . . RF OSCILLATOR with flyback power supply . . . complete TV SET . . . many other units. You see pulse, trapezoidal, saw-tooth wave forms. Get valuable PRACTICAL EXPERIENCE locating and correcting TV troubles. Mail coupon for facts and pictures.

A TESTED WAY TO BETTER PAY... MAIL COUPON NOW

Good for Both—FREE

The ABC's of SERVICING



MR. J. E. SMITH, President, Dept. 1DE
National Radio Institute, Washington 9, D. C.

Mail me FREE Lesson and 64-page book. (No salesman will call. Please write plainly.)

NAME ..... AGE .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

☐ Check if Veteran Approved for Training Under G. I. Bill

Editor
OLIVER READ, D. Sc., D. Litt., W9ETI

Managing Editor
WM. A. STOCKLIN, B.S.

Technical Editor
H. S. RENNE, M.S.

Associate Editor
RAY FRANK, W9JU

Eastern Editor
HAROLD BECKER

Television Consultant
MILTON S. KIVER

Short-Wave Editor
KENNETH R. BOORD

Editorial Assistants
I. M. CARROLL

E. V. HITZEL

P. B. HOEFER

Staff Artist
R. S. KUPJACK

Chief Draftsman
B. L. NEWMAN, W9ROB

Advertising Manager
L. L. OSTEN

Midwest Adv. Manager
JOHN A. RONAN, JR.

Art Director
HERMAN R. BOLLIN

COVER PHOTO: Margaret Whiting cuts a platter for Capitol Records as John R. Block engineers the recording at a specially-built console designed by Cinema Engineering of Hollywood. (Ektachrome by Peter J. Samerjan)

Chairman of the Board and Publisher
WILLIAM B. ZIFF

President
B. G. DAVIS

Secretary-Treasurer
ARTHUR T. PULLEN

Vice-Presidents
MICHAEL H. FROELICH
Dir. Eastern Div.

H. J. MORGANROTH
Production Director

LYNN PHILLIPS, Jr.
Advertising Director

H. G. STRONG
Circulation Director

BRANCH OFFICES

NEW YORK (17)
366 Madison Ave., MUrray Hill 7-8080

LOS ANGELES (14)
815 S. Hill St., TUcker 9213
Manager, WILLIAM L. PINNEY

First in radio-television-electronics

Average Paid Circulation over 200,000

RADIO & TELEVISION NEWS

Reg. U.S. Pat. Off.

Radio News Trademark Reg. U. S. Pat. Office • Television News Trademark Reg. U.S. Pat. Office.

CONTENTS

APRIL, 1951

Radio-Radar-Sonar in Naval Applications ..... *Samuel Freedman* 31
Versatile Equipment Key to Good Recording ..... *William Miller* 35
TV Receiver Conversion for Velocity Modulation ..... *M. A. Honnell & M. D. Prince* 36
New FCC Ham Rules ..... *Ray Frank, W9JU* 38
A Carrier Current Transmitter ..... *John Gort* 39
Saturable Reactors and Control Oscillators ..... *Ed Bukstein* 42
The Versatile Crystal Probe ..... *John T. Frye* 43
An Improved Equalizer-Preamp ..... *Charles P. Boegli* 46
The "Band-Edger" ..... *Ron Pickett, KH6AAD/6* 48
Horizontal Pulling (Part 2) ..... *John R. Meagher* 50
Practical Sound Engineering (Part 2) ..... *H. M. Tremaine* 53
Splitting Pads ..... *H. C. Carmichael* 56
Novel TV Antenna Installation Overcomes Mountain Terrain ..... *Albert E. Combs* 57
Transceiver for the Novice Ham ..... *Clark E. Jackson* 58
Helpful Hints on Servicing A.C.-D.C. Sets ..... *T/Sgt. Jay J. Lucas* 60
Mac's Radio Service Shop ..... *John T. Frye* 61
Four Bands with a Flat Line ..... *Aubrey Meadows, W4OLM* 116
Eliminating TVI Caused by the BC-610 ..... *R. H. Mitchell, W4RQR/5* 132
Radio-TV Service Industry News 140

DEPARTMENTS

For the Record ..... *The Editor* 8
Spot Radio News 14
Within the Industry 24
Short-Wave ..... *K. R. Boord* 62
New TV Products 68
What's New in Radio 92
MARS 110
Manufacturers' Literature 122
AFCA News 144
Technical Books 148

COPYRIGHT 1951
ZIFF-DAVIS PUBLISHING COMPANY
185 North Wabash Ave., Chicago 1, Ill.
VOLUME 45 • NUMBER 4

Member
Audit Bureau of
Circulations

RADIO & TELEVISION NEWS is published monthly by the Ziff-Davis Publishing Company at 185 N. Wabash Ave., Chicago 1, Ill. Copyright under International copyright convention. All rights reserved. Entered as second-class matter July 21, 1948, at the Post Office, Chicago, Ill., under the act of March 3, 1879. Entered as second-class matter at the Post Office Department, Ottawa, Canada. **SUBSCRIPTION RATES:** in U. S., Canada, Mexico, South and Central America and U. S. Possessions, $4.00 for twelve issues; in British Empire, $5.00; all other foreign countries, $5.00 for twelve issues. **RADIO-ELECTRONIC ENGINEERING EDITION SUBSCRIPTION RATES:** in U. S., Canada, Mexico, South and Central America and U. S. Possessions, $6.00 for twelve issues; in British Empire, $7.00; all other foreign countries, $7.00 for twelve issues. Subscribers should allow at least two weeks for change of address. All communications about subscriptions should be addressed to the Director of Circulation, 185 N. Wabash Ave., Chicago 1, Ill. **CONTRIBUTIONS:** Contributors are advised to retain a copy of their manuscripts and illustrations. Contributions must be accompanied by return postage and they will be handled with reasonable care, but this magazine assumes no responsibility for their safety. Any copy accepted is subject to whatever adaptations and revisions are necessary to meet the requirements of this publication. Payment covers all author's, contributor's and contestant's rights, title, and interest in and to the material accepted and will be made at our current rates upon acceptance. All photos and drawings will be considered as part of the material purchased.

NOW . . . GET EVERYTHING YOU NEED TO LEARN AND MASTER

TELEVISION

RADIO-ELECTRONICS ...AT HOME!

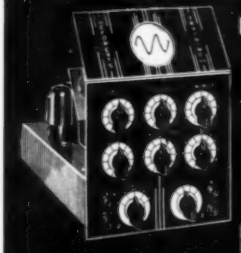
Use REAL commercial-type equipment to get practical experience

Here's the REAL THING!

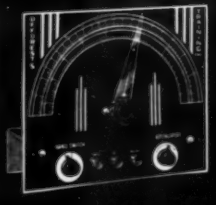
ABOVE: Build and keep a real 16 INCH commercial TV receiver. Optional after completing regular training at slight additional cost.

Your future deserves and needs every advantage you can give it! That's why you owe it to yourself to find out about one of the most COMPLETE, practical and effective ways now available to prepare AT HOME for America's billion dollar opportunity field of TELEVISION-RADIO-ELECTRONICS. See how you may get and keep the same type of basic training equipment used in one of the nation's finest training laboratories . . . how you may get real STARTING HELP toward a good job or your own business in Television-Radio-Electronics. Mail the coupon today for complete facts — including 89 ways to earn money in this thrilling, newer field.

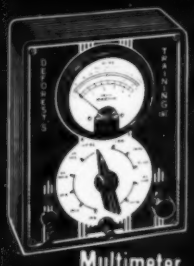
SET UP YOUR OWN HOME LABORATORY



Oscilloscope



R-F Signal Generator



Multimeter

6-Tube Radio

HOME MOVIES

D.T.I., ALONE, INCLUDES BOTH MOVIES and HOME LABORATORY

In addition to easy-to-read lessons, you get the use of HOME MOVIES — an outstanding training advantage — plus 16 big shipments of Electronic parts. Perform over 300 fascinating experiments for practical experience. Build and keep real commercial-type test equipment shown at left.

MODERN LABORATORIES

If you prefer, get all your preparation in our new Chicago Training Laboratories—one of the finest of its kind. Ample instructors, modern equipment. Write for details!

MILITARY SERVICE!

If you're subject to military service, the information we have for you should prove doubly interesting. Mail coupon today.

Get BOTH of these information packed publications FREE!

ACT NOW! MAIL COUPON TODAY!

DeFOREST'S TRAINING, INC., Dept. RN-4-H
2533 N. Ashland Ave., Chicago 14, Ill.

Without obligation, I would like your late News-Bulletin showing 89 ways to earn money in Television-Radio-Electronics . . . and how I may prepare to get started in this thrilling field.

Name ..... Age .....

Street ..... Apt. .....

City ..... Zone ..... State .....

De FOREST'S TRAINING, INC.
CHICAGO 14, ILLINOIS
A DeVRY INSTITUTION

Brush has it!

MIKES AND PHONES THAT ARE "CRYSTAL CLEAR"

HAND OR DESK MICROPHONE (BA-116)

Rugged dependability and uniform frequency response. Unbeaten in its price range for PA, home, institutional and industrial use. Use in hand or on desk without need of stand. But also equipped for use with standard ⅝" 27 thread stand. Brown metallic finish, 8' cable. List, $14.75.

"VIBROMIKE" (VM-1)

Miniature contact-type microphone with unusually wide frequency response. ⅞" x ¾" x ⅝". Output volume from .05 to .1 volt or higher. Complete with mounting clamp and 25' cable. List, $19.50.

NEW MICROPHONE (BA-109) FOR PA, HOME AND AMATEUR

A beautiful new microphone for applications that require natural reproduction of both music and voices. Uses an advanced development of the "Acousticel" cartridge pioneered by Brush. Pickup pattern non-directional in the horizontal plane. Essentially flat frequency response from 40 to 10,000 cps. Designed for use with ⅝" 27 thread stand. Finished in maroon plastic and brushed chromium . . . . . List, $22.50.

GENERAL PURPOSE MICROPHONE (BA-106)

Using the exclusive "Acousticel" cartridge. Vibration, shock, low frequency wind noise or humidity do not affect the high fidelity. Excellent for general use. Output level Minus 50 db. below 1 volt/bar . . . . List, $19.75.

LAPEL MIKE (BL-2)

Virtually flat response. Small and rugged. Can be used as hand or instrument mike, as well as lapel. 1½" x 2¼". Complete with 25' cable. List . . . . . $25.00.

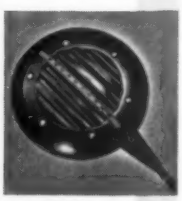
Monitor with a Brush Phone

High fidelity Model "A-1", $18.00

Model "A" general purpose, $12.00

Model "A" single phone, $6.45

Model "A" lorgnette phone, $9.75



"BA-303" Hushatone $9.75

You can get it!

Brush products are distributed all over U. S. A. If your own radio parts jobber does not have it, write to us and we will send you name of nearest jobber.

THE BRUSH DEVELOPMENT COMPANY

3405 Perkins Avenue • Cleveland 14, Ohio

YOUR OPPORTUNITY IS HERE NOW!

LEARN TELEVISION RIGHT AT HOME!

By the new method of

TRANSPONDENCE

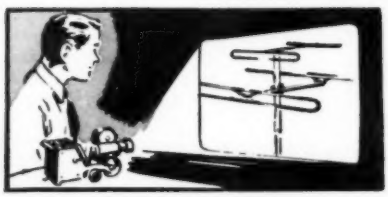
training on film and tape recordings

Now the De Forest-Sanabria Corporation—a division of the world's largest television training school—brings *class-room instruction* to you right in your own home! You actually hear your instructor's *recorded* voice. At the same time you watch "blackboard" size projected pictures, diagrams and illustrations. It's the quick, easy way to equip yourself for the big earnings in television—*today!*

LOOK . . . *You get the tape recorder and projector right at the start of your course!*

HEAR *your instructor*

It's even better than the classroom, because you can *repeat* the instructor's lectures until they're thoroughly understood.



SEE *2000 illustrations*

You learn quicker when you see diagrams and illustrations in *blackboard size.*

You get the famous "TRANSPONDER" precision built, high fidelity tape recording machine with your very first lesson—*and* a powerful projector with which you can view diagrams and illustrations enlarged to a size that makes them easy to see and understand.

APPROVED FOR VETERANS UNDER G.I. BILL

READ *from reference library*

You receive complete books, pamphlets and manuals to supplement your instructor's lessons.

ASK *your questions on tape*

Tell your instructor about anything that puzzles you and get his answers back pronto.

BE A SUCCESS . . . ACT NOW!

Millions of television set owners are demanding qualified television technicians to service their sets. There is a tremendous shortage of such qualified men today and will be for many years to come. Get in on the ground floor of this booming industry and be prepared to accept a steady, big pay job for life. We can qualify you quickly, easily, surely—and help get you a job when you complete your course. Send for illustrated booklet that gives the complete details.

The De Forest-Sanabria Corp.

An affiliate of American Television, Inc.

5050 North Broadway, Chicago 40, Illinois

MAIL COUPON TODAY!

De Forest-Sanabria Corporation
Dept. RN-4
5050 Broadway, Chicago 40, Ill.

FREE BOOK TELLS HOW

Dear Sirs:

Please send me copy of your free illustrated booklet which describes the new TRANSPONDENCE method of learning television at home under the direction of Dr. Lee de Forest and U. A. Sanabria.

NAME_____ AGE_____

ADDRESS _____

CITY_____ STATE_____

Check here ☐ IF VETERAN ☐ NON-VETERAN

Specially Designed for TV Technicians

New OVER/UNDER WELLER SOLDERING GUN

For ticklish TV soldering, there's no tool like the new 135-watt Weller Gun. Dual spotlights eliminate shadows. Precision balance assures accurate soldering. Long length reaches deep into chassis. 5-second heating saves time and current. Your Weller Gun pays for itself in a few months.

Check This Exclusive Combination of Features

- **5-SECOND HEATING**—No waiting. Saves power.
- **OVER/UNDER DESIGN**—Tube construction gives bracing action to tip, and improves visibility.
- **DUAL SOLDERLITE**—Prefocused spotlights completely eliminate shadows—let you see clearly.
- **LONGER REACH**—Slides easily into the most complicated set-up. Reaches tight corners.
- **COMPACT DESIGN**—Streamlined and precision balanced for delicate "pin-point" soldering.
- **TRIGGER-SWITCH CONTROL**—Adjusts heat to the job. No need to unplug gun between jobs.
- **DUAL HEAT**—Single heat 100 watts; dual heat 100/135 watts; 120 volts, 60 cycles. Handles *all* light-duty soldering.

See new Model WD-135 at your distributor, or write for bulletin direct.

- **SOLDERING GUIDE.** Get your new copy of "Soldering Tips"—revised, up-to-date and fully illustrated 20-page booklet of practical soldering suggestions. Price 10c at your distributor, or order direct.

WELLER ELECTRIC CORP.
810 Packer Street, Easton, Pa.

For the RECORD

BY THE EDITOR

CIVILIAN DEFENSE AND MRO SUPPLY

TO THOSE of us who are active in Civil Defense planning comes the realization that one of the greatest obstacles facing an adequate communications system for emergencies is the lack of supplies vitally needed to maintain, repair, and operate hundreds of transmitters, receivers, transceivers, and associated equipment. Essential items, normally purchased from distributors, are already scarce as the result of production cut-backs, scare buying, and "hoarding" of hard-to-get items.

Recently we needed a set of 22½ volt "B" batteries for a BC 221 frequency meter for calibrating emergency mobile frequencies on a mobile converter. In spite of the fact that there are several large component distributors in Chicago, we were not able to locate this stock item. It took more than a week to dig up three batteries. Other items, equally vital to emergency communications, are likewise conspicuous by their absence.

A resolution to the *Electronics Products* division of the *National Production Authority* was made recently by committees of the *Association of Electronic Parts and Equipment Manufacturers*, proposing that distributors who purchase MRO (maintenance, repair, and operating) supplies from a manufacturer be restricted to a 180 day inventory; that distributors sell such MRO supplies only to customers who certify in writing that the material will be used for repair and replacement.

With many services requiring electronic equipment, it is imperative that action be taken to insure that this equipment be maintained in good working order and repair. Such action is essential to the national defense program and vital to the public interest. Communication requirements are many and varied:

The Armed Forces require vast quantities of replacement components for signal, communication, and navigation equipment, as well as for fire control and other military uses. Defense Agencies and Departments need material for monitoring, testing, communicating, policing, and other government functions. State and local governments require a backlog of components for sundry municipal purposes and laboratories for testing, research, development, and experimental uses. Much equipment is used also at technical schools. They need repair parts and equipment for development, construction, research, and similar academic projects.

In civilian defense, particularly fire, police, health, and public welfare agencies, need special equipment and a well-stocked replacement source for the maintenance of good order and the health and well-being of the community. Common carriers, too, need equipment for the conduct of vital transportation functions.

In case of serious trouble it is essential that broadcasting facilities be maintained in good operating condition for the dissemination of news and for the civilian defense effort.

Radio amateur operators play an important part in any civil defense planning. They will require material for the maintenance of a radio network vital to civil defense. Then there are the civil defense agencies which require the use of home and automobile radio and home TV receivers for the dissemination of news, information, and instruction in the event of dire or national emergency. Manufacturers of military equipment and components that require test instruments and electronic operating supplies to fabricate their products will also require allocation of critical material for civil defense purposes. Existing governmental orders, regulations, and requirements have curtailed the use of critical raw materials in the manufacture of new electronic equipment, thereby putting a greater burden on equipment now in use. This existing equipment will continue to deteriorate and cease to function unless kept in good working order and repair. Some governmental agencies have already recognized the desirability and necessity of keeping such equipment in operation by permitting a greater use of critical raw materials for the manufacture of maintenance, repair, and operating supplies than is permitted for the manufacture of new equipment. However, no regulations have, at this writing, been promulgated by which manufacturers of such supplies can acquire the critical functional raw material necessary for fabrication.

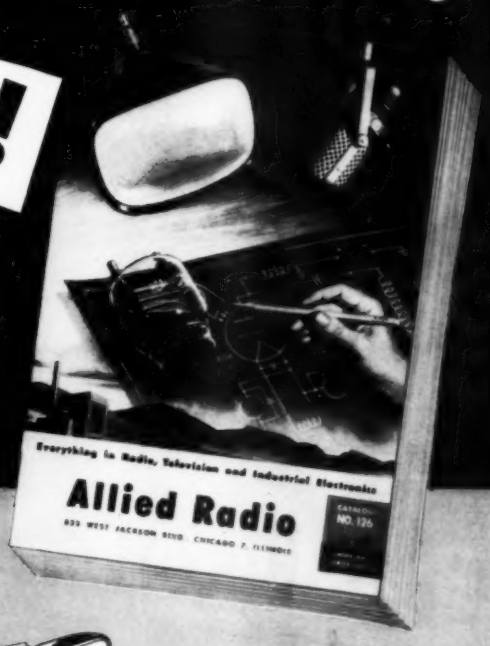
The amount of critical raw materials required to produce such maintenance and repair parts is infinitesimal in relation to the entire consumption by the industry of such critical raw materials. Yet the use of such a negligible quantity could result in keeping in good working order and repair, millions of dollars of vital electronic equipment.

The "case history" of the "B" battery is a good example of what can and will happen a thousandfold if provisions are not made now for a supply of parts and equipment for the specific needs of Civil Defense . . . . O.R.

GET IT! 1951 *ALLIED* catalog free!

the only complete up-to-date catalog for Everything in Radio, Television and Industrial Electronics

212 value-packed pages


Everything in Radio, Television and Industrial Electronics
Allied Radio
833 WEST JACKSON BLVD. CHICAGO 7, ILLINOIS
CATALOG NO. 126

Send for it today!

Here's the only *complete*, *up-to-date* Buying Guide to TV, Radio and Industrial Electronics—packed with the world's largest selections of quality equipment at lowest, money-saving prices. See the latest in TV, AM and FM receivers; radio-phonos; new Sound Systems and P.A. equipment; High-Fidelity Custom Sound components; recorders and accessories; full selections of newest Amateur receivers and station gear; test instruments; builders' kits; huge listings of parts, tubes, tools, books—the world's *most complete stocks* of quality equipment.

ALLIED gives you *every* buying advantage; speedy delivery, expert personal help, lowest prices, assured satisfaction, liberal time payment terms. Get the latest 1951 ALLIED Catalog. Keep it handy—it will save you time and money. Send for your FREE copy!

THE WORLD'S LARGEST STOCKS

- Radio Parts Unlimited
- Test Instruments
- Television & Home Radios
- P.A. and Hi-Fi Equipment
- Amateur Station Gear
- Supplies for Industry

QUICK, EXPERT SERVICE

SEND TODAY FOR RADIO'S LEADING BUYING GUIDE

ALLIED IS YOUR TELEVISION HEADQUARTERS

TV

To keep up with TV, depend on ALLIED! Count on us for the latest releases and largest stocks of picture tubes, component parts, antennas and accessories—plus the latest in TV tuners and kits. If it's anything in TV—depend on ALLIED!

ALLIED RADIO

the World's Largest Radio Supply House

EVERYTHING IN ELECTRONICS

free

ALLIED RADIO CORP.
833 W. Jackson Blvd., Dept. 1-D-1
Chicago 7, Illinois

☐ Send FREE 212-page 1951 ALLIED Catalog No. 126

Name_____

Address_____

City_____ Zone____ State_____

Hallicrafters Block Long Main Plant—Chicago, Ill.

hallicrafters

"The Radio Man's Radio"

Precision Radio

famous throughout the world . . .

Hallicrafters precision instruments have been sold in 89 countries, used by 33 governments. They are remembered by veterans, prized by experts, and preferred by radio amateurs throughout the world who want a radio that is all radio.

The BIGGEST *"Ham Shack"* in the World...

From the block-long building above comes more Ham equipment than any place else in the world. Its elegant Georgian design gracefully conceals the modern precision laboratories and humming production lines within.

New **S-76 $169.50**
DUAL CONVERSION RECEIVER WITH 50-KC 1-F

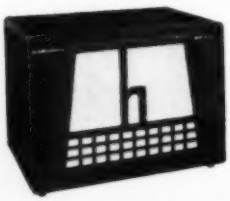
You've read about it, you've heard about it, now here it is—with the most wanted features, at the lowest possible price.

DUAL CONVERSION (1650 kc and 50 kc)—more usable selectivity than the best crystal.

GIANT 4-in. "S" METER—calibrated in microvolts and "S" units.

OTHER FEATURES: Four bands 538-1580 kc, 1720 kc to 32 Mc. Calibrated electrical bandspread. 5 position selectivity. Sensitivity 2 microvolts or better with .5 watt output. 9 tubes plus regulator, rectifier.

SX-71. 11-tube Double conversion receiver. 538 kc to 35 Mc. 46-56 Mc. Crystal filter.....$199.95.



R-46 SPEAKER
New 10" PM in Satin black cabinet. 80 to 5000 cycle range. 500-ohm matching transformer. 15" wide, 10⅞" high, 10⅛" deep....$19.95

the hallicrafters co.

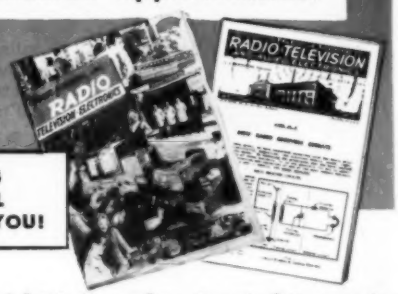
WORLD'S LEADING MANUFACTURER OF PRECISION RADIO & TELEVISION • CHICAGO 24, ILLINOIS

Learn RADIO TELEVISION, ELECTRONICS by SHOP METHOD HOME TRAINING

Let NATIONAL SCHOOLS, of Los Angeles, a practical Technical Resident Trade School for almost 50 years, train you for today's unlimited opportunities.

You receive all parts, including tubes, for building this fine, modern Superheterodyne Receiver. This and other valuable standard equipment becomes your property.

these two FREE books will tell you how



WE BRING NATIONAL SCHOOLS TO YOU!

GOOD JOBS AWAIT THE TRAINED RADIO TECHNICIAN

You are needed in the great modern Radio, Television and Electronics industry! Trained technicians are in constant and growing demand at excellent pay—in Broadcasting, Communications, Television, Radar, Research Laboratories, Home Radio Service, etc. National Schools Master Shop Method Home Study Course, with newly added lessons and equipment, can train you in your spare time, *right in your own home*, for these exciting opportunities. Our method has been proved by the remarkable success of National Schools-trained men all over the world.

You Learn by Building Equipment with Standard Radio Parts We Send You

Your National Schools Course includes not only basic theory, but *practical* training as well—*you learn by doing*. We send you complete standard equipment of professional quality for building various experimental and test units. You advance step by step until you are able to build the modern superheterodyne receiver shown above, which is yours to keep and enjoy. You perform more than 100 experiments—build many types of circuits, signal generator, low power radio transmitter, audio oscillator, and other units. The Free Books shown above tell you more about it—send for them today!

NOW! NEW PROFESSIONAL MULTITESTER INCLUDED

This versatile testing instrument is portable and complete with test leads. Simple to operate, accurate and dependable. You will be able to quickly locate trouble and adjust the most delicate circuits. You can use the Multitester at home or on service calls. It is designed to measure AC and DC volts, current resistance and decibels. You will be proud to own and use this valuable professional instrument.

GET THE DETAILS – SEND THE COUPON ➡

Lessons and Instruction Material Are Up-to-date, Practical, Interesting

National Schools Master Shop Method Home Training gives you basic and advanced instruction in all phases of Radio, Television and Electronics. Each lesson is made easy to understand by numerous illustrations and diagrams. All instruction material has been developed and tested in our own shops and laboratories, under the supervision of our own engineers and instructors. A free sample lesson is yours upon request—use the coupon below.

TELEVISION TRAINING A complete series of up-to-the-minute Television lessons is an integral part of your course, covering all phases of Television repairing, servicing and construction.

Here are just a few of the interesting facts you learn with the **FREE SAMPLE LESSON**

1. How radio receivers operate.
2. How the antenna circuit is constructed.
3. Converting signal currents into sound.
4. How the R-F transformer handles the signal.
5. How the tuning circuit functions.
6. The Radio "bands."

APPROVED FOR VETERANS Check coupon below.

NATIONAL SCHOOLS

LOS ANGELES 37, CALIFORNIA EST. 1905

MAIL OPPORTUNITY COUPON FOR QUICK ACTION

National Schools, Dept. 4-RN
4000 South Figueroa Street
Los Angeles 37, California

(Mail in envelope or paste on penny postcard.)

Mail me FREE the book "Your Future in Radio-Television" and the sample lesson of your course. I understand no salesman will call on me.

NAME_____ AGE_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

☐ Check here if [illegible] of World War II

Now... Stainless Steel shells

for rectangular picture tubes

The development of Stainless Steel shells for rectangular—as well as circular—picture tubes has added a few more tricks to the magic of television.

Picture quality is sharper and clearer than ever. That's because the face plate is separate from the metal shell, and can be made from drawn glass having better optical quality than that used in other tubes.

Tubes with Stainless Steel shells are also much lighter and easier to handle. They weigh from one-fourth to one-third less than other tubes. And adding this weight savings to that achieved through rectangular design, tube weight is further reduced. For example, the 17″ Stainless Steel rectangular tube shown here weighs but 10 pounds!

Besides being much lighter, these tubes are also stronger and safer—stronger and safer because the compression fit between the face plate of the tube and the metal shell provides greater resistance to outside atmospheric pressure.

Tubes made with Stainless Steel shells spell out real advantages for dealers and servicemen alike. They are easier to handle . . . easier to install. And another important item—the better picture they provide means more satisfied customers.

U·S·S 17-TV Stainless Steel—developed particularly for this job—is the ideal material for tube construction . . . more and more manufacturers are using it. You'll find it well worth your while to put plenty of sales effort behind the new sets with metal-shell tubes of U·S·S Stainless Steel.

AMERICAN STEEL & WIRE COMPANY, CLEVELAND · COLUMBIA STEEL COMPANY, SAN FRANCISCO
NATIONAL TUBE COMPANY, PITTSBURGH · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM · UNITED STATES STEEL COMPANY, PITTSBURGH
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

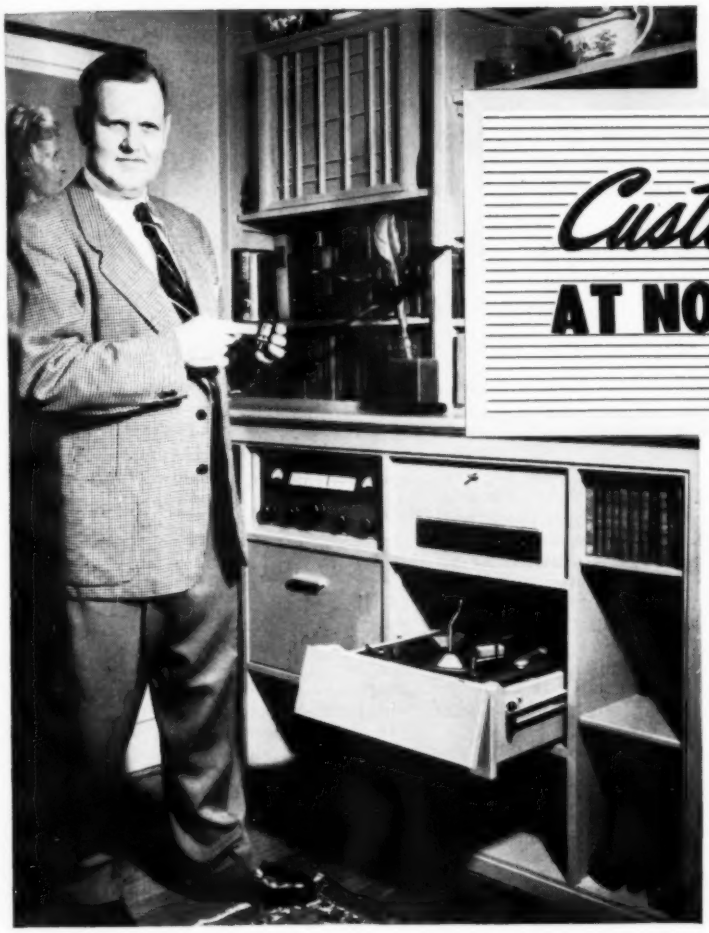
USS

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

1-340

UNITED STATES STEEL



Custom Quality AT NO EXTRA COST!

VARIABLE RELUCTANCE CARTRIDGES

WHERE cost is no problem, custom designers specify the best. Philip C. Kelsey of Guilford, Connecticut, shown here beside one of his made-to-order FM phonograph installations, says:

> "Customer satisfaction means everything in my business. That's why G-E cartridges are standard in all my installations. I know they are the best."

This same cartridge—with diamond or sapphire tip—belongs in your line and in your customers' sets. More than 100,000 G-E cartridges were sold last year—a better score than all other VR cartridges combined! Today, more than ever before, dealers will push quality merchandise backed by a name people believe in—General Electric.

Build Your Profits... Build Your Reputation

Stock the complete G-E Parts Line now—let your customers know you can put new life into radios, phonographs, TV sets, with General Electric

- **Speakers**
- **Styli**
- **Tone Arms**

Call your G-E distributor today, or write: *General Electric Co., Electronics Park, Syracuse, N.Y.*

JUST OUT! GET YOUR COPY NOW!

General Electric Company
Section 941
Electronics Park, Syracuse, N.Y.

Send me your new stylus booklet "Why You Should Use a Diamond."

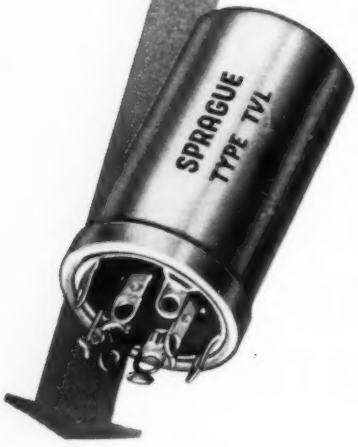
NAME_____

ADDRESS_____

CITY_____ STATE_____

GENERAL ELECTRIC

DESIGNED FOR
TV SERVICING



The best way to avoid costly service callbacks on TV electrolytic capacitor replacement jobs is to use Sprague 'lytics.

Actual service records prove they are tops for keeping you out of trouble with service customers—by keeping their TV sets working right!

And Sprague has the most complete listing of every type of television electrolytic.

Write for your catalog today!

SPRAGUE PRODUCTS COMPANY
DISTRIBUTORS' DIVISION OF THE SPRAGUE ELECTRIC COMPANY
51 MARSHALL ST., NORTH ADAMS, MASS.

Spot Radio News

★ *Presenting latest information on the Radio Industry.*

By RADIO & TELEVISION NEWS' WASHINGTON EDITOR

RADIO AND TV, repeatedly cited as a striking defense-program accessory, capable of providing limitless types of service, has now found itself accused of being a possible deterrent, too, and requiring a series of tight controls, even more stringent than those proposed during World War II. This time legislation, calling for a control of all types of electromagnetic radiations which might be used to guide an enemy plane or missile in an attack on the country, has been routed through the Department of Defense to the Senate and House, and not just from the floors of the Congress, as in the days of '41.

The proposed law, prepared by Assistant Secretary of Defense Marx Leva, was submitted to the chairmen of the Senate and House Committees on Armed Services, with a recommendation that it be enacted immediately. In a letter to the Congressional leaders, Leva said that the purpose of the new law was . . . "to provide the necessary Executive authority to control electromagnetic radiations, not only during hostilities or a proclaimed emergency, but also during time of strained international relationships, when a surprise attack on the United States is a possibility." He pointed out that the control would extend to anything . . . "capable of emitting electromagnetic radiations between ten thousandths and one-hundred thousand (.010-100,000) megacycles." Current concepts of warfare and recent experience, Leva continued, demonstrated the necessity to control such radiations, for the purpose of denying their use to a potential enemy for navigation of piloted or pilotless aircraft or missiles directed toward targets in this country.

The authority provided in the Communications Act of 1934 for a control of a similar nature is inadequate at this time, the Defense representative declared. The new approach must be adopted now, he said, in order that planning and preparations may be completed so that air defense plans may be implemented without delay in the event of an air attack.

The urgent need for the law was slated to be stressed during secret sessions with members of the Congressional committees, who will be presented with a detailed analysis of air defense problems and their relation to radiation control. The legislators were also scheduled to be told that the proposed ruling, which is part of the Defense Legislative Program, had been approved by the Bureau of the Budget as in accord with the President's program.

Senator Edwin Johnson and Representative Carl Vinson, who introduced the measures to their respective bodies, felt that the proposals were too drastic, and broadcasters agreed, adding that radio and TV silencing in the manner suggested was not only undesirable, but unnecessary. In their opinion the stations should be kept on the air to boost morale and aid in sounding an alarm in case of an attack. Both the FCC and the Continental Air Command have in the past expressed a similar sympathetic feeling and, as a result, studied the possibilities of continued operations.

The versions of the bills offered to the Congress, were substantially milder than the originals sent to the committee leaders. Particularly missing from the measures was the phrase indicating that official controls could be invoked in times of . . . "strained international relationships", which proved to be quite disturbing to everyone, implying that even under present conditions there could be a cessation of transmission of any or all types.

Seething debates on the measures have been forecast by members of both chambers.

DEFENSE RADIO ACTIVITIES were not only accented on Capitol Hill but in the offices of many departmental administrators. At Civil Defense headquarters, FCDA Administrator Millard F. Caldwell, Jr., was busy briefing civil defense directors. During a special one-day session, the heads of State units received a comprehensive review of the functions of air-raid warning systems, communications-control centers, the Continental Air Command, the FCC and the civil defense office from Robert Burton, communications director for FCDA. He discussed the controversial silence problem, as well as the use of the ham bands during emergencies, operation of interceptor commands, air raid warning devices, the operation of mobile systems and financing of centers.

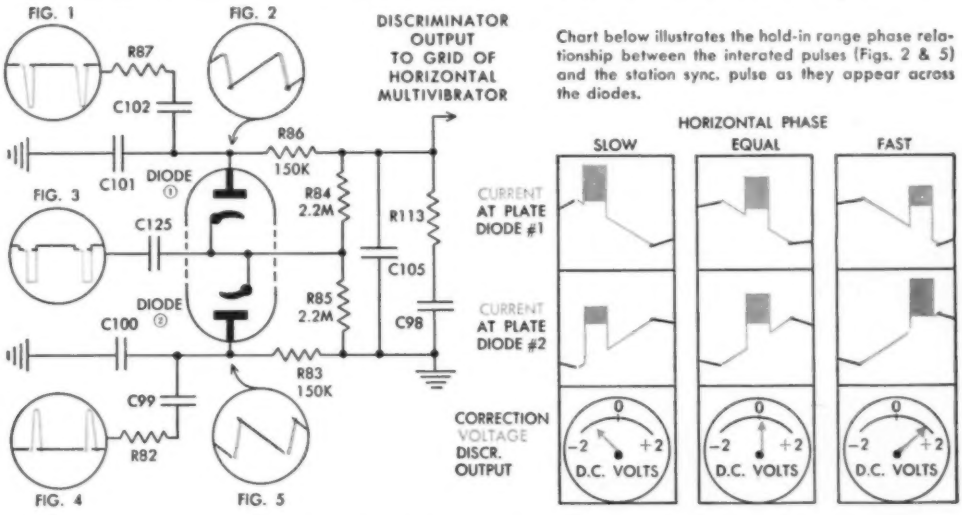
The civil-defense planners of the District of Columbia were also involved

Service Clinic!

Latest information to help you better service Raytheon

Automatic Frequency Control is essential for stable horizontal synchronization under the various signal and interference conditions encountered in field operation.

The A.F.C. Discriminator shown below utilizes both negative and positive pulses (Figs. 1 & 4) from the horizontal output. These pulses are integrated to form the sawtooth sloped waveshapes (Figs. 2 & 5) that are applied to the diode plates across R83 and R86. The station sync. pulses (Fig. 3) are applied to the diode cathodes across R84 and R85.



Horizontal Frequency Compensation results from the combined series phase relationship of voltages across R84 and R86 and across R83 & R85. These voltages appear across both diodes as illustrated in the chart above and will cause current to pass in opposite directions through R84 and R85. This creates a D.C. voltage drop in both R84 and R85 of a polarity such as to cancel in the output when the horizontal frequency is in phase with the station.

Sync. Stability of the A.F.C. discriminator used in Raytheon TV receivers provides a picture in perfect synchronization with the television camera and is free of tearing or side waver.

The Horizontal Multivibrator is so designed as to slow down when positive D.C. voltage is applied to the grid and to speed up with negative D.C. voltage. Thus, an unbalance in D.C. output from the discriminator as a result of phase difference will provide corrective compensation to the grid of the horizontal multivibrator.

Condenser C105 provides a multivibrator grid by pass to grd. completing the multivibrator feedback loop. R113 & C98 serve as a 60 cy. filter with a recovery time-constant capable of following station horz. frequency variations and with proper pull-in characteristics.

Improved circuitry such as this is one of many reasons why you can feel free to recommend Raytheon TV to a friend or a customer.

RAYTHEON TELEVISION

Belmont Radio Corp., 5921 W. Dickens Ave., Chicago 39, Ill.
Subsidiary of Raytheon Manufacturing Co.

Dependably Built for Dependable Performance

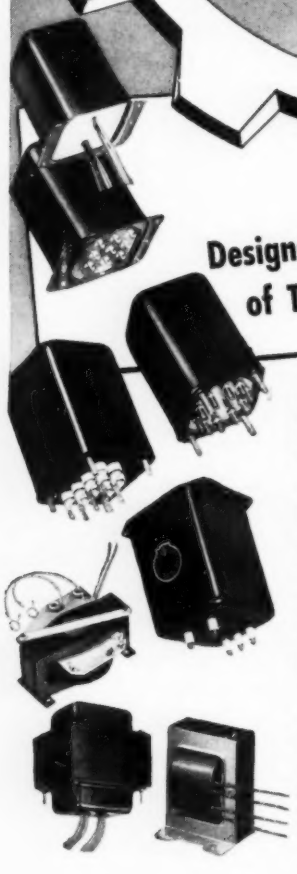
REPLACEMENT OR REFUND OF MONEY
Guaranteed by Good Housekeeping
IF NOT AS ADVERTISED THEREIN

THE STARLIGHT—Model RC-1720

CHICAGO

Preferred Transformers geared to TODAY'S ELECTRONIC CIRCUITS

Designed to Meet The Requirements of Today's Most-Used Tube Types



1. Power Transformers. Famous, advanced-design, Sealed-in-Steel construction. Exactly suited to specific requirements—one range of ratings expressly designed for capacitor input, another for reactor input.

2. Full Frequency Audio Transformers. For optimum performance—high-fidelity ±½ db from 30 to 15,000 cps. Other ranges available: Public Address—±½ db, 50-10,000 cps; Communications—±½ db, 200-3,500 cps.

3. JAN-T-27 Transformers. Now available for quick shipment from stock. Hermetically-sealed units which meet all requirements of Grade I, JAN-T-27 specifications for Class A operation. Full range of Power, Audio and Reactor units available.

4. Driver and Modulation Units. For Amateur and commercial speech transmitters. Matched sets of drivers, modulation transformers and reactors provide frequency response ±1 db over entire range from 30-15,000 cycles.

5. Television Transformers. A complete catalog line in a range of designs that are the exact duplicates of units used in leading TV sets. Built by CHICAGO—the largest single manufacturer of original equipment TV transformers.

WRITE FOR FREE CATALOGS

You'll want these two important Catalogs—the *New Equipment Line* listing Sealed-in-Steel and JAN-T-27 units, and the *Replacement Line* showing a complete range of Radio, TV and Vibrator transformer replacements. Send for these valuable FREE catalogs today—or get them from your distributor.

CHICAGO TRANSFORMER

DIVISION OF ESSEX WIRE CORPORATION

3501 ADDISON STREET • CHICAGO 18, ILLINOIS

CHICAGO TRANSFORMER CTC 1895 TRADE MARK REG.

in quite an active preparation program, conferring with broadcasters and setting up definite plans of operation. After one series of meetings, orders for six transmitters were rushed out; two 250 watters for command centers and four 50-watters for geographical-control centers. In addition, orders were placed for standby-power generators and an assortment of walkie-talkie units.

Special equipment has also occupied the attention of specialists during the conferences. One unit, discussed at length, has been the alert receiver, which offers an air-raid warning to broadcasters, and can be applied to control-centers. Announced in '41, the device is said to have been considerably improved. The unit, about the size of a portable receiver, turns on automatically when it receives a special sub-audible signal from a broadcast station, rings a bell, turns on a red or yellow light, according to the kind of an alert being sent, and a white light when the all-clear signal is flashed. The device may be fixed tuned to any one broadcasting station. At the transmitting station, the alert's signal-generating unit is connected to the transmitter, the output being connected to the microphone circuit of the transmitter. When a button is pressed it releases an *on* sub-audible signal which turns on all alert receivers equipped to be activated by it.

In other defense-role programs, emergency communications for plant protection has become a favored topic, with many plans following a pattern suggested in an intriguing report by Ken Piper, former special agent in charge, FBI. Piper pointed out in his review of the situation that radio is the . . . "one means of communications that penetrates walls and traverses distances without the use of wires, without time delay. In this virtue lies its strength, value and dependability." Describing how the systems can be used, he said that a central transmitter and receiver could be installed in a central protected area, with remote control established in the normal office of the superintendent. Small battery-operated portable receivers and transmitters could then be located at the watchman's headquarters and his posts through the grounds. In addition, disclosed Piper, materials-handling trucks, run-about wagons, jeeps, and other similar vehicles could be equipped with two-way FM transmitters and receivers. Also recommended was a receiver tuned to the frequency of the local police department, who in turn should also have a receiver tuned to the frequency of the plant. By placing radio units strategically about an area, with operators assigned to each post, complete obliteration of vital information transmission facilities would be almost impossible, both within a given plant and between nearby plants, viewed Piper in his report. By the adoption of two-way systems, Piper declared, manu-

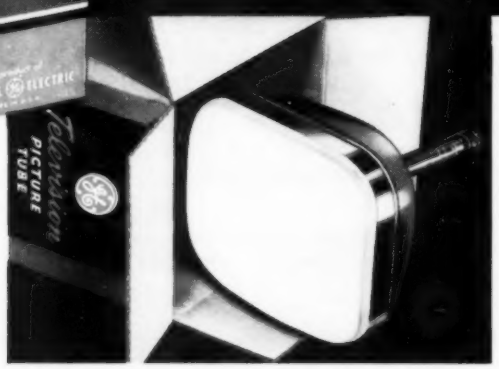
(*Continued on page* 76)

"WE HAD TO LICK CALL-BACKS BEFORE THEY LICKED US!"

"Quality tubes proved to be the answer. That's why we feature G-E."

"We were giving time away—in repeat visits to customers who complained their sets didn't work properly. Most of the trouble came from tube failures. We had to stop them, if our radio-TV service was to keep on paying. So we made quality tubes a "must" at Chambers—principally G-E tubes, the brand every serviceman respects! Now our men, when they repair sets, know that the owners will *stay satisfied*. And service shows a steady profit on our books. Consequently, all of us here are strong for General Electric tubes—boost them every chance we get."

Says **HAROLD K. CHAMBERS**
Chambers Radio and Appliance Co.
3546 North Ashland Avenue,
Chicago, Illinois



Service customers ask to see the G-E monogram on tube cartons. Chambers and other radio-TV firms have found that out. It's visible proof of tube quality—extra evidence to owners that good receiver performance may be expected long after the serviceman has left.

Test after test assure the *uniform* high quality of G-E tubes. Here G-E receiving tubes get a factory "short" test. Later comes an electrical-characteristics check; also tests for noise, microphonics, life, appearance, gas, air, and hum. G-E tubes perform better because they are better!

FOR QUALITY TUBES TO CUT DOWN YOUR CALL-BACKS, SEE YOUR G-E TUBE DISTRIBUTOR!

GENERAL ELECTRIC

181-KA4

in the southeast

RELIABILITY

sold

2215 EXPERTS

SAYS BILL GRIGSBY

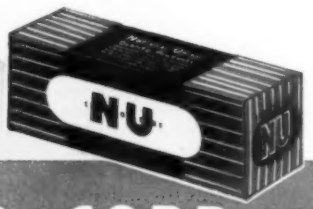
Southeastern Radio Parts Co.
Georgia: Atlanta, Savannah
Alabama: Montgomery
South Carolina: Columbia

We don't guess when we stock tubes. We meet the demand of our 2,215 Servicemen and Service Dealers who have made N. U. tubes their first choice. These experts know from actual experience that N. U. tubes meet the strictest service requirements . . . that N. U. tubes are uniform, reliable, properly designed for interchangeability. The confidence of our customers in N. U.'s quality control and advanced research makes N. U. tubes profit-makers for all of us.

renew *with* N.U.

premium quality tubes

- **RADIO and TELEVISION RECEIVING TUBES**
- **VIDEOTRON TELEVISION PICTURE TUBES**
- **PANEL LAMPS**
- **TRANSMITTING and SPECIAL PURPOSE TUBES**



NATIONAL UNION RADIO CORP.

Main Office: 350 Scotland Rd., Orange, N. J.
Research Division: Orange, N. J. • *Plants:* Newark, N. J.—Hatboro, Pa.

Model 666-R

NOTE the wide ranges of this compact pocket-size instrument. Note controls—flush with panel. Then study the inside view. Nowhere will you find, in design and manufacturing quality, the equal of 666-R.

A BASIC TOOL

POCKET-SIZE: VOLT-OHM-MIL-AMMETER

WITH SELF-CONTAINED RESISTANCE RANGES TO 3 MEGOHMS

1. Resistance Ranges from 0-3000 Ohms (.5 Ohm low reading) to 3 Megohms, self-contained. Also A.C.-D.C. Volts to 5000, 10 ranges; and 3 Direct Current ranges.

2. Enclosed Selector Switch. molded construction. Keeps dirt out, and retains contact alignment permanently.

3. Unit Construction—Resistors, shunts, rectifier, batteries, are housed in a molded base integral with the switch. Direct connections without cabling. No chance for shorts.

4. Resistors are precision film or wire-wound types, each in its own compartment.

ONLY $26.50—at your Distributor

In Canada: Triplett Instruments of Canada, Georgetown, Ontario.

FOR THE MAN WHO TAKES PRIDE IN HIS WORK

Triplett

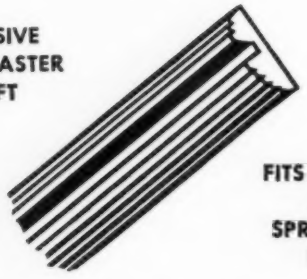
TRIPLETT ELECTRICAL INSTRUMENT CO., BLUFFTON, OHIO, U. S. A.

ıe Most Adaptable Small Control You Ever Saw...

GIVES YOU WIDEST REPLACEMENT COVERAGE WITH FAR LESS STOCK!

60 IRC Q CONTROLS WITH *ADAPTABLE* FIXED SHAFTS cover *all* important values—give you *complete* replacement coverage with minimum stock—and slash your inventory investment to the bone. No other control line so closely meets your servicing needs. No other gives you so much for your money. Here's why...

EXCLUSIVE KNOB MASTER SHAFT



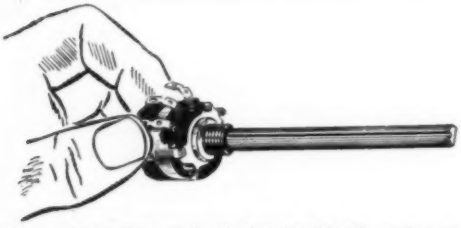
FITS KNURLED AND SPRING-TYPE KNOB

Here's the shaft you've dreamed of for years—a shaft that will fit virtually all your standard knob requirements without inserts or modification—a shaft you can just cut to length and use.

IRC's Knob Master Shaft is shown in exploded view above. Note these points of construction:

1. Substantial portion of shaft is knurled. It readily fits most knurled knobs without slotting of shaft. Either tight or loose knobs may be fitted by slotting shaft for ⅜" and adjusting ends by spreading or compressing.
2. Flat of shaft accommodates all spring-type push-on knobs requiring normal 3/32" deep flat.
3. Groove simulates narrow flat for spring-type knobs requiring 1/32" deep flat. Also provides guide for slotting where needed.

Knob Master Shaft is standard with *all* Type Q Replacement Controls. Eliminates need for stocking several different controls of the same value because of shaft differences. Far more expensive to make than ordinary replacement shafts, Knob Master is exclusive with IRC.



TYPE Q FEATURES ¼" LONG BUSHING. Independent survey, plus IRC engineering study, prove that a ¼" long bushing will permit more replacements than will the conventional ⅜" long bushing. Only IRC provides you with a complete standard line of controls of the small 15/16" size with the *shorter* bushing necessary for maximum replacement use.

INTERCHANGEABLE FIXED SHAFTS give you widest coverage of control replacements with a far smaller stock of controls. Resilient Retainer Ring lets you remove Knob Master Fixed Shaft and replace with any of 13 special fixed shafts. Interchange takes less than a minute, using only a pocketknife or screwdriver. You meet almost any special requirement without expanding control stocks.

ASSEMBLE YOUR OWN STANDARD AND CONCENTRIC DUALS, TOO!

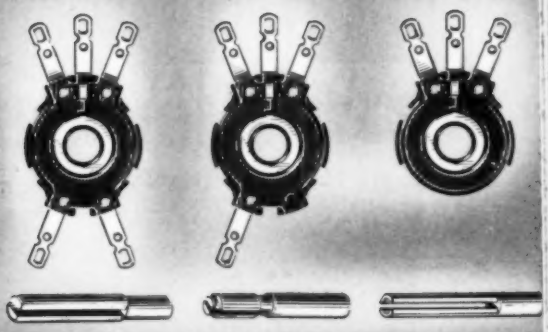
Two sensational IRC developments answer the great majority of your dual replacement problems—and eliminate long searches and waits for exact duplicates.

With IRC's amazing new CONCENTRIKIT of specially designed, universal parts, you can quickly assemble over 90% of all concentric dual types—in home and auto sets as well as in TV.

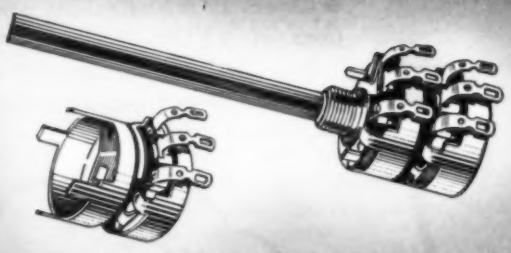
For standard duals, exclusive IRC MULTISECTIONS can be added to Q Controls just like switches—in just a few seconds - convert standard controls to duals, triples or even quadruples.

NOTHING COULD BE SIMPLER, EASIER, MORE PRACTICAL!

NO MORE WORRYING ABOUT EXACT DUPLICATES. In a matter of minutes you can assemble your own concentric dual —with IRC's original CONCENTRIKIT. Each CONCENTRIKIT contains 11 *universal* parts which you combine with separate shaft ends and base elements. Step-by-step instructions, included in each kit, make CONCENTRIKIT fool-proof. It's the practical answer to television's ever-increasing need for concentric duals.



LIMITLESS OPPORTUNITIES for adapting controls to specific requirements—that's what you get with these Interchangeable Base Elements and shaft ends. Each unit contains molded base element, terminals and collector ring—no loose parts. Designed for use with CONCENTRIKIT, these base elements are available in a wide assortment of resistance values and a variety of taps. They may also be interchanged in any standard Q Control.



STANDARD GANGED CONTROLS ARE EASY TOO. For standard duals, triples, quadruples, add IRC MULTISECTIONS just as you would switches. 20 of these units provide over 11,000,000 variations—give you coverage from 500 ohms to 10 megohms. No need to stock or search for standard duals. Flexible, easy-to-use MULTISECTIONS are the answer to ganged-control problems.

New Type 76 Switches are quickly and easily attached to any IRC Q Control. In addition to Type 76-1 Single Pole, IRC now provides a double pole unit as well—Type 76-2. IRC Q Controls are so designed that switch throw takes place after contactor reaches terminal adjacent to switch toggle. This makes electrical rotation of control the same with or without switch.

IRC

INTERNATIONAL RESISTANCE COMPANY

401 N. Broad Street, Philadelphia 8, Pa.

Wherever the Circuit Says -WW-

INTERNATIONAL RESISTANCE COMPANY

415 N. BROAD ST., PHILA. 8, PA.

Please send me additional IRC Q Control information in latest issue of Catalog Bulletin DC-1.

NAME .....

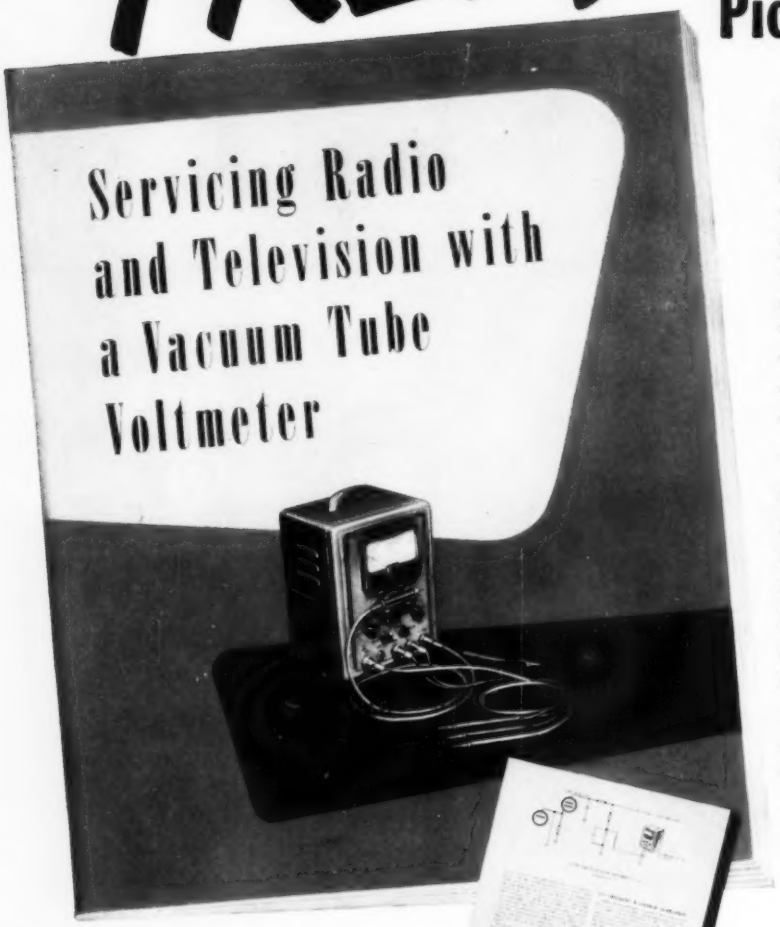
COMPANY .....

ADDRESS .....

.....

FREE!

With purchase of ONE Sylvania Picture Tube



- 48 pages of pictures and diagrams.
- **COVERS RADIO SERVICING**—Signal Tracing, Alignment, AVC and AFC Checking, Measurement of Voltages, Signal Levels, Power Output, Bandwidth and much more.
- **COVERS TV SERVICING**—Signal Tracing, Bandwidth Measurements, Wavetrap Checking, Sound Channel Tests and Alignment, Low and High Voltage Checks, Signal and Deflection Voltage Measurements etc.
- **COVERS AUDIO AMPLIFIER SERVICING**—DC, AC, and Signal Level Measurements; Tone Control, Fidelity, and Gain Tests, Distortion, Power Output and Noise Level Measurements; Signal Tracing, Speaker Matching.
- Covers 19 Miscellaneous Applications of VTVM—Detecting Gassy Tubes, Checking Capacitors, Q Measurement, Turns Ratio Measurement, Impedance Checking.

ACT NOW! Offer good only April 1st to May 31st

Here's a book that will save you hours of service time every week. You'll be amazed how it will simplify everyday service problems. You can't buy this book! It comes to you FREE with the purchase of just one Sylvania TV Picture Tube from your regular Sylvania Distributor. That's all, simply buy a Sylvania Picture Tube, of any type, and your Distributor will give you a copy free. See or write him today.

Sample pages showing detailed, easy-to-read diagrams.

SEE YOUR **SYLVANIA** DISTRIBUTOR FOR YOUR COPY TODAY

SYLVANIA ELECTRIC PRODUCTS INC. 1901–1951 FIVE DECADES 50th ANNIVERSARY OF PROGRESS

SYLVANIA ELECTRIC

RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES, LIGHT BULBS; PHOTOLAMPS; TELEVISION SETS

Jobs are looking for men again!
Qualified Technicians Needed for

TELEVISION and FM SERVICING

TELEVISION SERVICEMEN
$100 PER WEEK
Inside or outside men, with or without car. We pay car expenses! Modern, air-conditioned shop! Vacation with pay! Group hospitalization! 20% employee discount privileges! Time and one-half for all overtime work! Wonderful opportunity for advancement!

TELEVISION INSTALLERS
One of Washington's largest television installation companies has an opening for a thoroughly experienced crew. This is a permanent job, averaging better than
$150 PER WEEK.
Must have car, ladders, tools. EDWARD M. METER CO., 8230 3rd st. N.W. No. 7.

TELEVISION SERVICEMAN, TV experience for home service calls; car allowance, excellent pay, perma-

CREI HOME STUDY
can help you to better jobs in servicing or Armed Services!

ADS like these testify to the demand that exists for qualified TV technicians. As one well-informed industry spokesman puts it, "Technicians may soon be as scarce as certain tubes." With the electronics industry expanding, and with growing military demands cutting sharply into the available supply of skilled personnel, now is certainly the time to improve your electronics know-how. And if you're headed for the Armed Services, your improved technical ability can be recognized and rewarded with interesting supervisory work at higher ratings in vital radar, navigation, or communications units.

Anyone already in the field—if he is to get ahead— can't depend on hit-and-miss methods for TV servicing. Practical knowledge is required. CREI home study offers just the practical course you need to qualify for the well-paid technical jobs. Designed by teaching specialists—the same group which has made the CREI Residence School outstanding—this practical course is kept up-to-date through daily contact with CREI's affiliated retail sales-and-servicing stores (one of Washington's largest TV retailers).

Now is unquestionably the time to prepare. If you want promotion, more money, and the kind of training that is respected by industry and the Armed Services, investigate CREI. Send for—and study—the free booklet offered below. The sooner you begin your training, the better off you'll be—in TV servicing work, or in military service. The cost is nominal for this training, the terms easy. Send for complete data—right now!

THE THREE BASIC CREI COURSES:

★ **PRACTICAL RADIO ENGINEERING**
Fundamental course in all phases of radio-electronics

★ **PRACTICAL TELEVISION ENGINEERING**
Specialized training for professional radiomen

★ **TELEVISION AND FM SERVICING**
Streamlined course for men in "top-third" of field

ALSO AVAILABLE AS RESIDENCE SCHOOL COURSES

CAPITOL RADIO ENGINEERING INSTITUTE

An Accredited Technical Institute Founded in 1927

Dept. 114C, 16th & Park Rd., N. W. Washington 10, D. C.
Branch Office: San Francisco, 760 Market St.

MAIL COUPON FOR FREE BOOKLET

CAPITOL RADIO ENGINEERING INSTITUTE
Dept. 114C, 16th & Park Road, N. W., Washington 10, D. C.

Gentlemen: Send booklet, "Your Future in the New World of Electronics," together with details of your home study training. CREI self-improvement program and outline of course. I am attaching a brief resume of my experience, education and present position.

Check Field of Greatest Interest:
- ☐ Practical Television Engineering
- ☐ Practical Radio Engineering
- ☐ TV, FM & Advanced AM Servicing
- ☐ Aeronautical Radio Engineering
- ☐ Broadcast Radio Engineering (AM, FM, TV)
- ☐ Radio-Electronics in Industry

If Residence School in Wash., D. C. Preferred, Check Here ☐

NAME ..... AGE .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

new!

PYRAMID

TINY TYPE 85LPT

TUBULAR PAPER CAPACITORS

Fit anywhere!

Suitable for 85°C. operation!

CAPACITANCE RANGE:
.0001 TO .5 MFD.

VOLTAGE RANGE:
200 TO 600 V., INCLUSIVE

Sturdily built in phenolic-impregnated tubes. Ends are plastic-sealed.

WRITE FOR COMPLETE LITERATURE
Representatives and Distributors Throughout the U.S.A. and Canada

PYRAMID

PYRAMID ELECTRIC COMPANY
1445 Hudson Boulevard
North Bergen, N. J., U. S. A.
TELEGRAMS: WUX North Bergen, N. J.
CABLE ADDRESS: Pyramidusa

Within the INDUSTRY

EVERETT S. LEE has been appointed editor of the *"General Electric* Review," monthly engineering magazine published by the *General Electric Company.*

Mr. Lee succeeds Edward C. Saunders who retired recently from the company after serving as executive editor of the publication since 1926. The new editor was formerly executive engineer of the company's General Engineering Laboratory in Schenectady and is a past president of the American Institute of Electrical Engineers. In addition to his editorial duties he will continue his active work in professional engineering and engineering educational circles.

* * *

THE ELECTRIC ASSOCIATION of Chicago has announced that due to the current international situation and its effect on the availability of television sets and other electrical merchandise the association's Fourth Annual National Television & Electrical Living Show held each year in Chicago has been postponed.

This event which has stimulated considerable consumer interest in the past three years may be resumed in 1952 depending on the conditions prevailing at the time.

Announcement of the postponement of this year's show was made jointly by the Electric Association and the Chicago Coliseum, home of the Show.

* * *

WILLIAM F. HALSEY, JR., has been elected president of *International Telecommunication Laboratories, Inc.,* associate of the *International Telephone and Telegraph Corporation.* Admiral Halsey is also a member of the board of *I.T.&T.* and chairman of the board of directors of *All America Cables and Radio, Inc.* . . . **WILMER T. SPICER** has been named chief engineer of maintenance services by the *Bendix Radio Division.* He will be responsible for the administration of the technical publications and field engineering departments of the division . . . **DAVID C. PRINCE,** vice-president of *General Electric Company,* has been named to the staff of the company's president . . . **MORTON P. ROME** has been elected vice-president in charge of the contract division of *Emerson Radio & Phonograph Corporation* . . . **N. J. PETERSON** has been named sales manager of the *General Electric Company's* Tube Divisions and will be responsible for the sale of all products of the divisions to the federal government . . . **OAKLEY F. HOYT** is the new director of defense production for *Hudson Wire Company* . . . **HENRY T. HEALD,** president of Illinois Institute of Technology, has been elected to the board of directors of *Stewart-Warner Corporation.* He fills a newly-created seat on the board . . . **EDWIN WEISEL, JR.,** is the new advertising and sales promotion manager of *Air King Products Company, Inc.* He was formerly associated with *Tele-King Corporation* . . . **STANLEY K. WEBSTER** has been named chief engineer of *Beltone Hearing Aid Company* . . . The radio and television division of *Stewart-Warner Corporation, Stewart-Warner Electric,* has named **IVAR G. BLACKBERG** chief purchasing agent . . . **ALLAN EASTON** is the new head of the microwave section of *Radio Receptor Co., Inc.* He was formerly chief engineer of the production engineering division of *Teletone Radio Corporation* . . . The new director of purchases for *Capehart-Farnsworth Corporation* is **ROBERT B. BROWN** . . . **WILLIAM HARGREAVES** has been named vice-president in charge of engineering for the *Transicoil Corporation* of New York.

* * *

WILLIAM D. STROBEN has been appointed to the post of advertising and promotion manager of the Radio & Television Division of *Sylvania Electric Products Inc.*

Mr. Stroben was formerly the advertising and sales promotion manager for the *Thor Corporation* in Chicago and prior to that served as promotion manager for the Range and Water Heater Division of *Hotpoint, Inc.,* also of Chicago.

At the same time the company announced the promotion of Arthur A. Currie to the position of Field Sales Manager for the Radio & Television Division. He was formerly the district sales manager for the New England-Eastern New York State sales territory.

* * *

NATIONAL ELECTRONIC & SERVICE DEALERS ASSOCIATIONS, a new national organization of associations representing servicing technicians and service dealers, was recently launched in Washington, D. C., by 22 technician and service dealer association delegates.

The aims of the new organization include the furtherance and improvement of the electronic servicing industry, the promotion of the welfare of service dealers and technicians, the fostering of a better understanding between the electronic service industry and the electronic industry, the promo-

THE CATHODE—
THE WORLD'S GREATEST PAINTER—
SHARES
RAYTHEON'S 101

RAYTHEON TELEVISION PICTURE TUBES

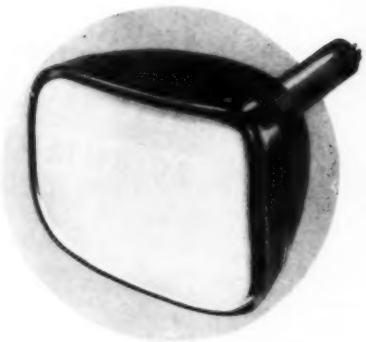
ACTUAL SIZE

are given *101* basic tests and checks to insure their quality. The cathode pictured produces the electron ray that paints the picture on the tube's screen and will perform perfectly, because it has passed its share of Raytheon's *101* Tests.

This strict control of quality means Raytheon Picture Tubes, like all Raytheon Products, are precisely right both electrically and mechanically. As pioneers in the development and manufacture of almost every type of electronic tube, Raytheon has the know-how and skill that makes Raytheon Picture Tubes *Right for Sight!*

Add precision workmanship to advanced design and you'll readily realize why you're always right if you use Raytheon Picture Tubes for every replacement and conversion job.

Ask your Raytheon Tube Distributor about these Quality Raytheon Picture Tubes.



Right for Sight!

RAYTHEON®

Excellence in Electronics

RAYTHEON MANUFACTURING COMPANY
Receiving Tube Division
Newton, Mass., Chicago, Ill., Atlanta, Ga., Los Angeles, Calif.

RADIO AND TELEVISION RECEIVING TUBES, CATHODE RAY TUBES, SPECIAL PURPOSE TUBES, SUBMINIATURE TUBES, MICROWAVE TUBES

Peak

the Picture Power with an INLINE* ANTENNA

Specify AMPHENOL -INLINE* TV ANTENNA

The Amphenol Inline Antenna has a single forward lobe. This means it intercepts peak signal power from one direction. Numerous minor lobes, which are absent from the Amphenol Inline Antenna, frequently pick up reflected signal causing "ghosts" and poor picture quality.

Everyone judges the performance of his set by the picture on the screen. However, it is the receiver *plus* the antenna that creates the picture. To get the most from any set specify Amphenol Inline Antenna!

*REISSUE PAT. NO. 23,273

AMPHENOL

AMERICAN PHENOLIC CORPORATION
1830 SOUTH 54TH AVENUE • CHICAGO 50, ILLINOIS

tion of better relations with the public, a provision for educational facilities for its members, the raising of standards of the electronic servicing profession, and cooperation with federal, state, and municipal agencies.

Temporary officers were named at the meeting and include Max Leibowitz of New York as president, Norman R. Selinger of Washington, D. C., as vice-president, Richard R. Devaney of Philadelphia as corresponding secretary, Roger K. Haines of Haddonfield, New Jersey as recording secretary, and Vance E. Beachley of Harrisburg, Pa. as treasurer.

Samuel L. Marshall of New York City was appointed chairman of the publicity and inter-organization relations committees, James L. Burns of Washington is the head of the membership committee, while Frederick J. Schmidt of Steelton, Pa., has been named chairman of the steering committee.

Organization headquarters have been set up at Dorchester House, located at 1625 Kolorama Road, N.W., in Washington, D. C.

* * *

EDWIN DORSEY FOSTER, former chief of naval material in the office of the Secretary of the Navy and holder of the rank of vice-admiral, has been named director of the newly-established Mobilization Planning Department of the *RCA Victor Division* of the *Radio Corporation of America.*

The new department which Admiral Foster heads is designed to assure the most effective operation to meet the government requirements for the research, development, and manufacture of vital electronics equipment for the defense program. The new department supersedes the company's Mobilization Planning Committee which was established after the outbreak of the war in Korea and functioned until a short time ago.

* * *

GLEN McDANIEL, 39-year-old lawyer and vice-president of the *Radio Corporation of America,* was elected president of the Radio-Television Manufacturers Association—the first full-time, paid president in the association's history.

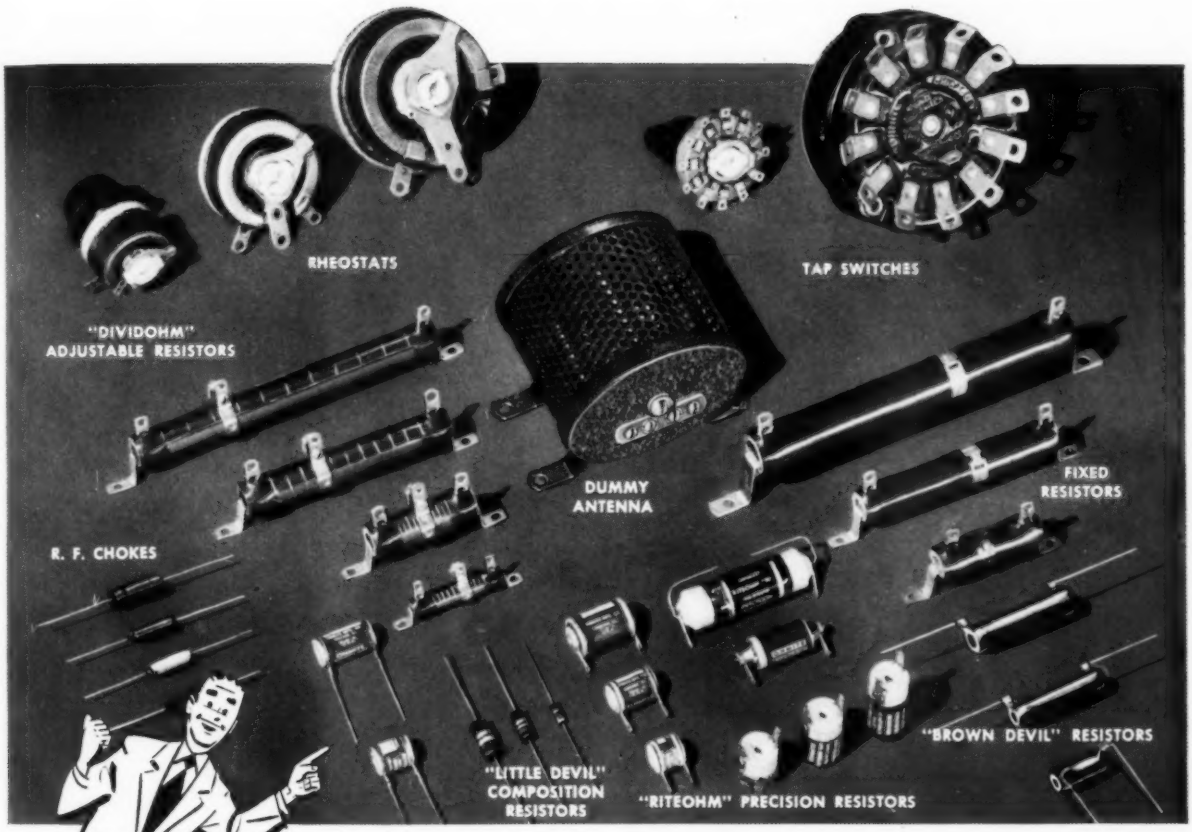
Robert C. Sprague who has been serving as both president and chairman of the board of RTMA has resigned as president but will continue as chairman of the board. His resignation became effective upon Mr. McDaniel's taking office on April 1st. James D. Secrest, who has been serving as general manager and secretary of the association since August 1, 1950, will continue in this capacity under the reorganization program.

The board of directors, at the same session, authorized the establishment of a committee to act on material shortages, voted to continue its fight against the proposed excise levy on radio and television sets, took up the matter of technician training and servicing complaints, and discussed other matters vital to the industry, including the establishment of a committee to confer with government officials on the allocation of scarce materials.

* * *

CHANNEL MASTER CORPORATION has recently completed a 25,000 square foot addition to its Ellenville, New York plant . . . **RAYTHEON MANUFACTURING COMPANY** opened a new pilot tube plant in Quincy, Massachusetts recently. The new factory is being operated by the receiving tube division of the company and is located approximately 15 miles from the main plant at Newton . . . **ELECTRO-CONNECTOR MANUFACTURING CORP.** has recently increased its production facilities almost five-fold with the completion of a new plant at 190 W. Glenwood Ave. in Philadelphia . . . **GENERAL ELECTRIC COMPANY** has begun construction on a new four-story tube manufacturing building in Owensboro, Ky. The plant is expected to be in operation some time in July. The company is also building a million dollar electronics plant at Auburn, New York for its Receiver Division . . . The Department of the Army has announced that construction will soon start on a new Army

(*Continued on page* 115)



You Can't Beat OHMITE for DEPENDABLE PERFORMANCE!

When you see the Ohmite name on an electrical component, you can depend upon that part to give long, trouble-free service.

Every Ohmite product is designed and constructed to stand up under the most severe service conditions . . . to give extra performance . . . to withstand the effects of shock, vibration, temperature extremes, altitude, and humidity. And, it is this extra performance Ohmite products give that so often makes the difference between satisfactory and unsatisfactory operation.

The Ohmite line includes ten sizes of close-control rheostats ranging from 25 to 1000 watts . . . fixed and adjustable wire-wound vitreous-enameled resistors from 5 to 200 watts . . . composition resistors, precision resistors, non-inductive resistors, tap switches, and R. F. and power line chokes . . . all in a wide selection of types and sizes. When you need dependable electrical components, play safe and specify Ohmite!

OHMITE MANUFACTURING CO.
4884 Flournoy St. Chicago 44, Ill.

Be Right with

WRITE FOR STOCK CATALOG

OHMITE®

RHEOSTATS • RESISTORS • TAP SWITCHES • CHOKES • ATTENUATORS

"Mr. Bell, I heard every word you said — distinctly!" Thus, on March 10, 1876, Alexander Graham Bell (left) learned that his invention had transmitted the first intelligible speech.

75 Years of Tomorrows

Like today's telephone, Alexander Graham Bell's invention was a product of research. For several years Bell had been investigating speech and hearing, and devising methods and apparatus for the electrical communication of intelligence. No one had transmitted speech sounds electrically but Bell saw that it must be possible—given the proper instruments.

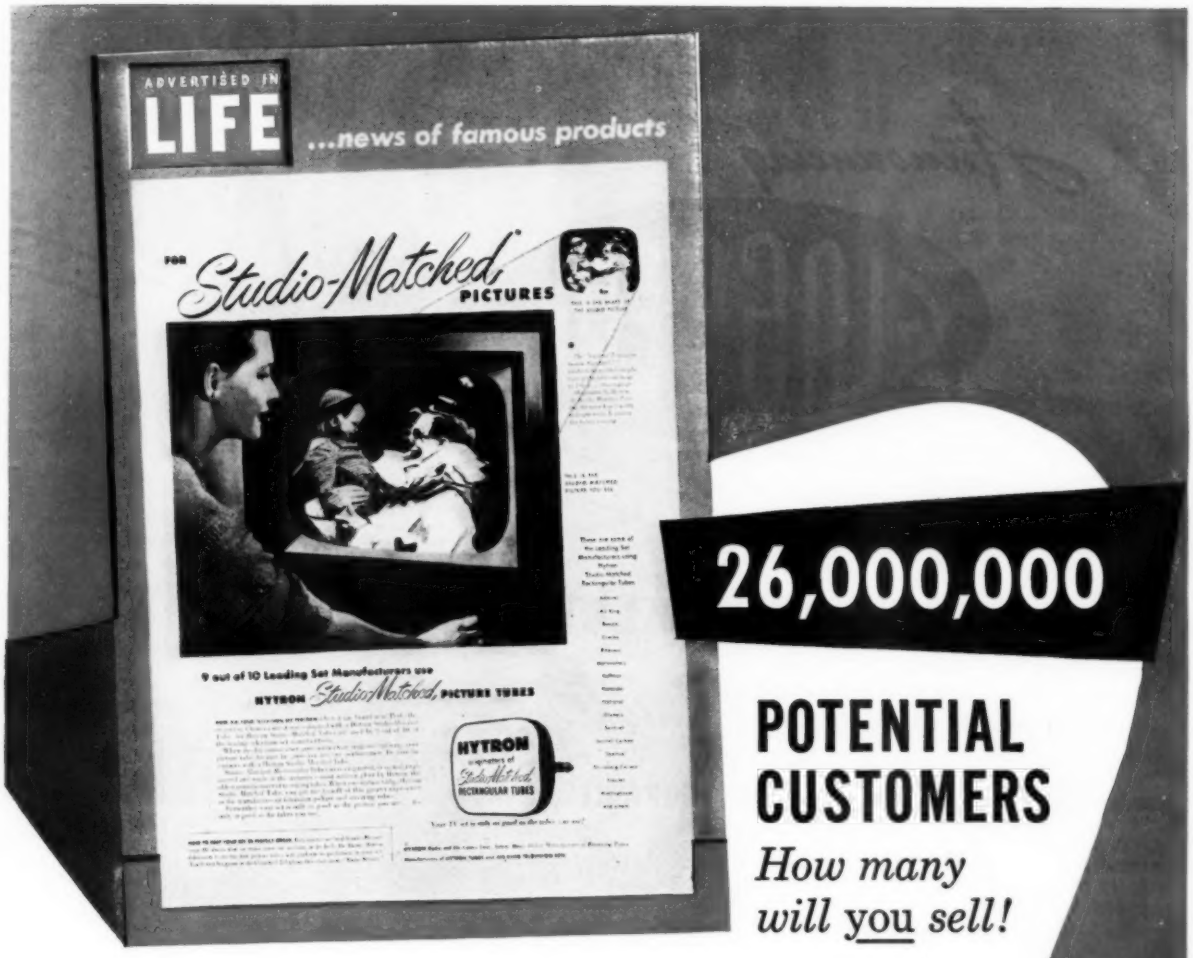
One day, while experimenting with his harmonic telegraph, Bell's alert ear caught an unexpected sound in the receiver. His trained mind told him that here at last was the proof that sound waves could travel as their facsimile in electric waves. Then followed a year of development, and in 1876, as shown above, he transmitted the first intelligible speech by telephone.

During the next three-quarters of a century, the telephone research which Bell started has grown and expanded to serve your telephone system . . . often fruitfully overflowing into other fields of electrical communication. In today's Bell Telephone Laboratories, promising ideas find the right skills to bring them to life. Through skilled manufacturing by Western Electric Company and skilled operation by the telephone company they are brought to the service of the telephone user.

The high quality of your telephone today, its fine, swift service at reasonable cost, are the products of work in the telephone laboratories in the past. The greater value you may expect in the future is taking form there already.

BELL TELEPHONE LABORATORIES

Exploring and Inventing, Devising and Perfecting, for Continued Improvements and Economies in Telephone Service



LIFE for March 12, starts the ball rolling: 26,000,000 readers. This timely full-page ad. An ideal sales package — original Hytron *studio-matched* rectangular tubes. The choice of 9 out of 10 leading TV set makers. All backed by this *free,* sure-fire "Advertised in LIFE" display card for *your* window and *your* counter. Play safe. Call your Hytron jobber *today.* Make sure you don't miss this tie-in display card. Get your share of those 26,000,000 potential customers!

MANUFACTURERS OF RECEIVING TUBES SINCE 1921
HYTRON
RADIO AND ELECTRONICS CORP.

HYTRON RADIO TUBES

***MAIN OFFICE:* SALEM, MASSACHUSETTS**

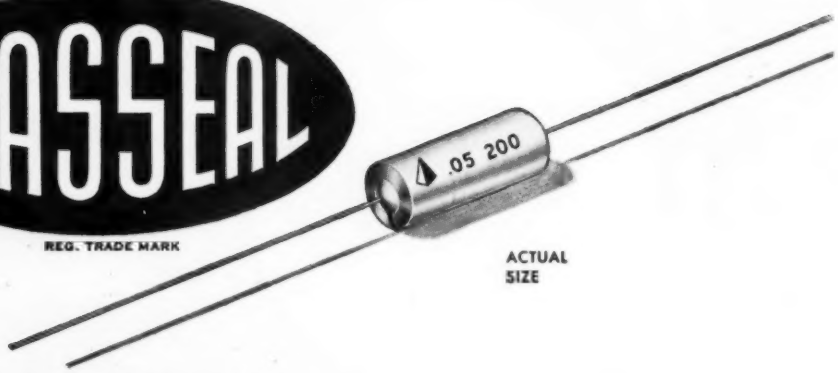
NEW 5th EDITION
Hytron Reference Guide for Miniature Electron Tubes

FREE from your Hytron jobber. Miniature types are still multiplying fast. You need this new Hytron Reference Guide. Originated by Hytron, it is unique . . . complete. Lists all miniatures to date, regardless of make. Six pages of pertinent data. 165 miniatures — 33 of them new. 81 basing diagrams. Lists similar larger prototypes. Get your free copy of this old friend brought up to date—today from your Hytron jobber.

Announcing

GLASSEAL

REG. TRADE MARK



ACTUAL SIZE

HERMETICALLY-SEALED *Miniature* TUBULAR PAPER CAPACITORS by PYRAMID

Pyramid Type PG "GLASSEAL" miniature paper capacitors are assembled in metal tubes with glass-metal terminals. They will fully meet the most exacting demands of high vacuum, high pressure, temperature cycling, immersion cycling and corrosion tests.

TEMPERATURE RANGES: −55° to +125°C.

CAPACITANCE RANGE: .001 mfd. to 1.0 mfd.

VOLTAGE RANGE: 100 to 600 v.d.c. operating

Available through your local distributor

PYRAMID Electric Company

GENERAL OFFICES and PLANT NO. 1
1445 HUDSON BLVD. • NORTH BERGEN, N. J.

PLANT NO. 2
155 OXFORD ST. • PATERSON, N. J.

RADIO—RADAR—SONAR in NAVAL Applications

Fig. 1. A radar-equipped PT boat.

By SAMUEL FREEDMAN
Technical Products and Services Co.
Santee, California

Radio-electronics plays a vital role in all naval operations. Vast laboratories work night and day to keep the U. S. Navy ahead in such developments.

A DISCUSSION of radio, radar, and sonar equipment in naval applications must, of necessity, be confined to declassified information at this time. Nevertheless, naval electronics today embraces all phases of radio and its offshoots, as developed during the past half century. It is used extensively on land, on the sea, under the surface of the sea, and in the air. It includes infrared, guided missiles, and atomic developments. It covers the entire frequency spectrum from very high powered, very low frequency stations (below 20 kc.) through the various frequency bands used for radiotelegraphy, radioteletype, radiotelephony, facsimile, and television. It extends to the microwave region for radar and communications. It continues still further to infrared or invisible light and even to the radioactive band of the electromagnetic spectrum where frequencies may be as high as 100 trillion megacycles or more—regions where electromagnetic waves are also known as rays or particles.

Although many of these naval applications are paralleled or even exceeded by the Army and the Air Force, the use of electronics extends into the activities of the Bureau of Ships, Bureau of Aeronautics, Bureau of Ordnance, training activities of the Bureau of Personnel, and, on a small but expanding scale, into the activities of the Bureau of Medicine and Surgery.

The Navy today has many major multi-million dollar laboratories and test centers which are wholly or primarily concerned with electronics. Their work overlaps only because electronics affects every phase of naval operations in such a way that so far it has been impractical to establish a single "Bureau of Electronics." These major laboratories and test centers include such installations as: The David Taylor Model Basin near Washington, D. C.; The Naval Research Laboratory of the Office of Naval Research in Anacostia, D. C. and its annex on Chesapeake Bay; The Naval Ordnance Laboratory in White Oak, Maryland, for the Bureau of Ordnance; The Special Devices Laboratory of the Office of Naval Research at Sands Point, Long Island; The Underwater Sound Laboratory of the Bureau of Ships and the Office of Naval Research at New London, Conn.; The Naval Air Development Station at Johnsville, Pa.; The Naval Air Test Center at Patuxent, Maryland; The Naval Air Missile Test Center at Point Mugu, California; The Naval Ordnance Test Station at Inyokern, California; and The Navy Electronics Laboratory of the Bureau of Ships at San Diego, California.

The staffs of these laboratories, which are made up of both naval and civil service personnel, range from a few hundred to several thousand employees. In addition, this force is backed up by other activities in common with other defense services and the large laboratories of the National Advisory Committee on Aeronautics, such as the Ames Aeronautical Laboratory at Moffett Field, California. Their work is further reinforced by contracts and subcontracts for research, development, and production which are awarded to various industrial firms, universities, and laboratories in the United States. University contracts may cover strictly naval research problems or may be awarded

Fig. 2. A naval communication room at the Cheltenham, Maryland, Naval Radio Station. In this installation both manual equipment and the newer radioteletype units are used.

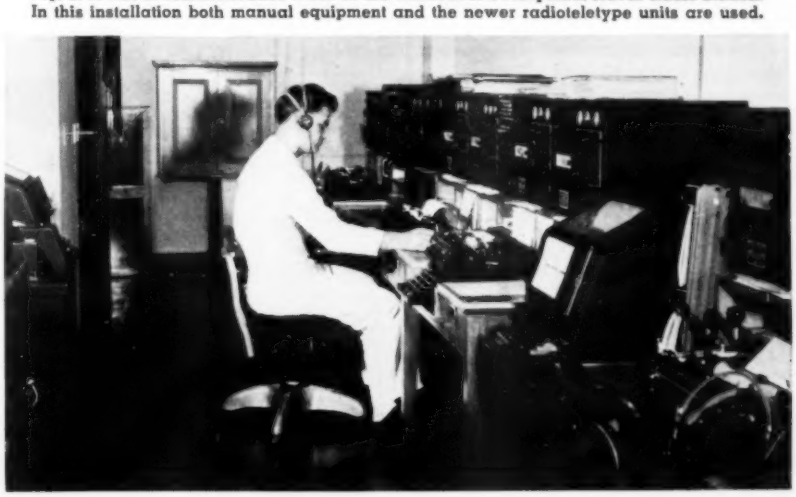


Fig. 3. Radar equipment in operation at the Naval Research Lab.

Fig. 4. Loran receiver indicator aboard a Coast Guard vessel.

in conjunction with the parallel requirements and interests of the other defense services.

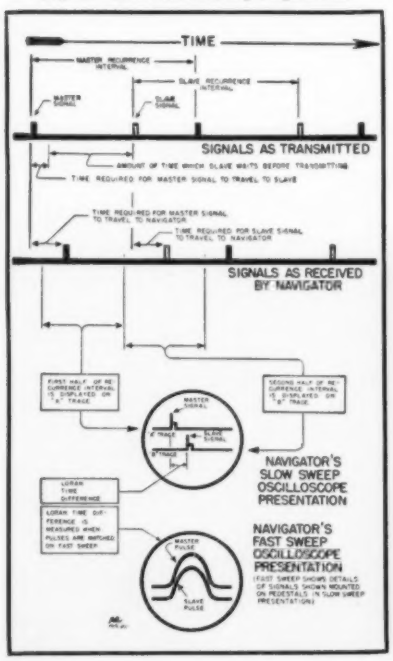
This research program also reaches into such activities as those of the Radio Technical Committee for Aeronautics, the Air Navigation Development Board, the Research and Development Board, and the Radio Technical Committee for the Marine Services, etc., all of which are primarily civilian in nature.

Although the United States is singularly blessed in having a vast production potential, the Armed Services have not left their development programs to chance. Hundreds of millions of dollars have been spent in the past five years on research, development, and the production of prototypes.

Those who were familiar with the Navy electronics organization during World War II will find that the Navy's dominant electronics organization, the Bureau of Ships, has continued to operate more or less intact although with a skeleton force. There have been practically no changes in the code organization setup other than those necessary to take care of new developments. The Bureaus of Aeronautics and Ordnance have likewise developed programs to take care of the electronics requirements of their particular branches. The small wartime Office of Patents and Inventions and the subsequent Office of Research and Inventions has been greatly expanded and is currently operating under the designation of the Office of Naval Research with a fine field laboratory of its own. Electronics, originally confined to naval communications apparatus, has now grown until it reaches into every phase of naval activity. In addition to its communications uses, electronics now serves in the fields of navigation and ordnance.

The advent of radar on naval vessels, including several different types which perform specialized tasks, has skyrocketed the number of electron tubes in operation aboard such craft. This same condition also applies to aircraft and submarines. During World War II, the average submarine carried equipment using considerably more than 500 electronic tubes, but today that number has been increased and the range of the craft has been expanded as a result of improved and increased radio, radar, and sonar equipment aboard such vessels.

Fig. 5. The loran timing sequences.


TIME
MASTER RECURRENCE INTERVAL
SLAVE RECURRENCE INTERVAL
MASTER SIGNAL
SLAVE SIGNAL
SIGNALS AS TRANSMITTED
AMOUNT OF TIME WHICH SLAVE WAITS BEFORE TRANSMITTING
TIME REQUIRED FOR MASTER SIGNAL TO TRAVEL TO SLAVE
TIME REQUIRED FOR MASTER SIGNAL TO TRAVEL TO NAVIGATOR
TIME REQUIRED FOR SLAVE SIGNAL TO TRAVEL TO NAVIGATOR
SIGNALS AS RECEIVED BY NAVIGATOR
FIRST HALF OF RECURRENCE INTERVAL IS DISPLAYED ON "A" TRACE
SECOND HALF OF RECURRENCE INTERVAL IS DISPLAYED ON "B" TRACE
A TRACE
B TRACE
NAVIGATOR'S SLOW SWEEP OSCILLOSCOPE PRESENTATION
LORAN TIME DIFFERENCE
LORAN TIME DIFFERENCE IS MEASURED WHEN PULSES ARE MATCHED ON FAST SWEEP
NAVIGATOR'S FAST SWEEP OSCILLOSCOPE PRESENTATION
(FAST SWEEP SHOWS DETAILS OF SIGNALS SHOWN MOUNTED ON PEDESTALS IN SLOW SWEEP PRESENTATION)

The unit has a gross speed of 60 words-per-minute as compared with 25 words-per-minute for fast radiotelegraphy. Radioteletype was first used under combat conditions during World War II at Iwo Jima and later proved itself at Okinawa and during the air strikes against the Japanese mainland. It is widely used now and,

Fig. 6. The loran line of position.

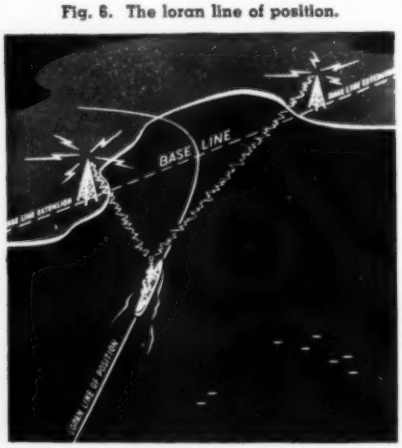


Fig. 1 is an example of the use of radar equipment aboard even the smallest naval craft. Visible on top of the mast is the "thinking cap" of the PT boat. This so-called "Radome" bulb houses the antenna of the radar set aboard the vessel. Radar has proven invaluable to the hard-hitting PT boats because they operate chiefly under the cover of darkness. Under such conditions, radar's electronic eye pierces this Stygian gloom for a horizon and indicates targets as to direction and distance, in addition to providing warning of navigational hazards. When a PT boat operates against a large enemy vessel, it enjoys the advantage in that the larger ship yields a much stronger indication on the PT's radar screen and for a greater distance than the PT registers on the larger ship's screens. The PT because of its smaller dimensions and because it is fabricated of wood has poorer reflective properties and is, therefore, harder to pick up on the radar screen of the enemy vessel.

Many devices, usually considered as "land-based," have now been adapted to aircraft and seagoing uses. One such unit is the radioteletype. Fig. 2 shows a battery of radio apparatus and the radioteletypes used in naval communications. The Navy has adapted teletype to radio operation and has produced a workable combination which eliminates the need for an operator to decode a series of dots and dashes. The unit is an ordinary teletype which is connected by means of a converter to the radio transmitting and receiving apparatus. When receiving, the converter changes radio impulses into electrical energy which actuates the teletype. The transmitting process is identical.

for example, when the President of the United States travels on a naval vessel, radioteletype is used to maintain constant contact with his office in Washington.

Fig. 3 shows one of the many types of radar installations likely to be encountered on naval vessels. More compact versions have been developed for use on submarines and in aircraft. Developed independently by American, British, French, and German scientists during the decade preceding World War II, the refinement of radar equipment received its greatest impetus upon the opening of hostilities. First used in the detection of surface objects in the near distance and under conditions of poor visibility, radar's range and versatility was extended to provide long range detection of airborne as well as surface objects, improve accuracy in fire control, provide safety in navigation, and facilitate the identification of distant and unrecognizable planes and ships. Present day equipment is now practically foolproof.

Figs. 4, 5, and 6 show a loran installation (LOng-RAnge-Navigation) which developed as an offshoot of radar for sea and air navigation. Kept under wraps during World War II, it was declassified after the war to permit its use by merchant marine vessels and civilian aircraft. The Coast Guard operates the necessary land stations required for its use. Fig. 4 shows a navigating officer aboard ship operating a loran receiver-indicator to obtain data regarding the position of his vessel. Fig. 5 illustrates the principle of operation of the device. Two stations in the prewar 160 meter radio amateur band transmit in such a manner that the master station (the one which initiates the pulsing event) actuates and is followed by a pulse transmission (40 microseconds later) by another station (called the slave station) which may be as much as 300 miles distant. There can only be one place within the radio receiving range of about 600 miles ground wave or 1400 miles skywave where a predetermined time difference in reception of those two pulses will exist. By reference to a loran-type of map, a line of position can be determined for that pair of stations whose signals arrive with that specified time difference. With this arrangement, the location of a ship can be pinpointed to within a quarter of a mile. The use of low frequencies and high intermittent pulsed power makes reception of the loran signals possible for hundreds of miles. By picking up another pair of stations (the slave station for one pair can also serve as the master station with respect to a station beyond it) another loran line of position can be provided so as to give another positional reference line. This second line can then intersect with the one plotted for the first pair of stations. If a third pair of stations can be received, the location of the ship can be determined beyond doubt. Many pairs of loran stations can utilize the same frequency channel by using different pulse repetition rates. In this way only one pair of pulses will show up as stationary ones for a particular group selection when viewed on the cathode-ray tube indicator. Fig. 5 shows how this information looks on the cathode-ray tube indicator. By selecting increasingly faster sweep rates for the CR tube of the receiver-indicator, the two pulses (master and slave) are measured first coarsely and then minutely down to the last microsecond difference of the time of arrival. The received pulses are first lined up on their respective pedestals. The master pulse is made to stop on the stationary pedestal either at the left end or the beginning. The slave pulse is then similarly lined up on the adjustable pedestal by means of an electronic knob control. The unit is then switched to a faster sweep of the tube to magnify the two pulses in question. The amplitude of one is increased or decreased as necessary so that one is fully superimposed on the other. When they merge to resemble a single pulse without overlap, the time difference is read directly in microseconds on a veeder counter. By knowing which pair of stations was used (shown on the station selector switch), for example, Pair 2, and the time difference (as shown on the veeder counter), for example, 1220 microseconds, the ship's line of position may be established by referring to loran line of position 2-1220 on the map. Experienced personnel can take such a reading in a matter of seconds. They can also per-

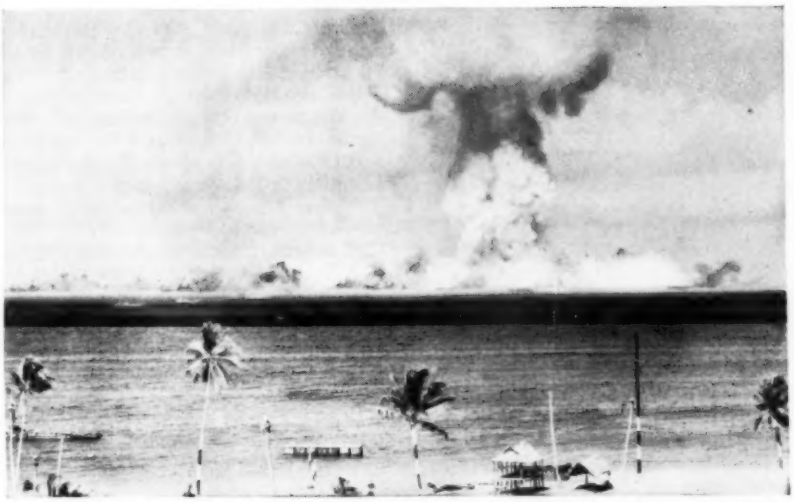
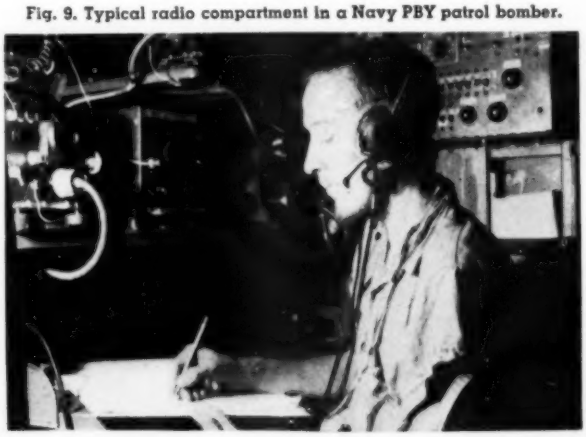


Fig. 7. The atomic shock wave. A few seconds after the "Able Day" bomb exploded at Bikini, a camera in the tower on the atoll recorded the atomic pressure wave thusly.

Fig. 8. A v.h.f. direction finder on an aircraft carrier deck.

Fig. 9. Typical radio compartment in a Navy PBY patrol bomber.



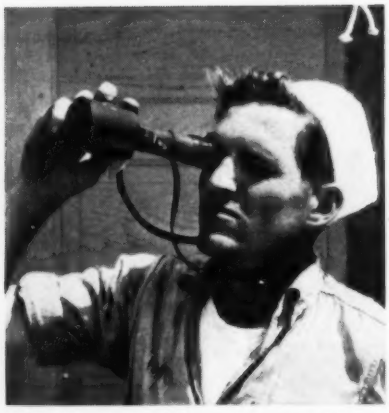


Fig. 10. A simple type viewer used by signalmen to read messages sent with the otherwise invisible infrared light.

form this operation continuously or as often as required.

Fig. 7 portrays one of the greatest and most important applications of electronics in warfare—the atomic bomb. This weapon represents new frontiers in electronics since every step of the bomb's development as well as its control involves the use of electronic apparatus and techniques.

One heavy utilization of electronics is peculiar to the Navy. That is in the field of underwater sound detection, known as sonar. Sonar utilizes both audible (sonics) and inaudible sound (supersonics), chiefly the latter. This sonar equipment is used to detect submarines and surface vessels by means of the sound waves they set up in the water. It is the submarine's most useful electronic device when it is submerged. A fathometer is also considered a sonar device but this equipment operates only in a vertical plane. Sonar is comparable to radar inasmuch as it sends out a pulse and waits for the pulse to return before sending out further pulses. The time taken for the pulse to travel to its target and return is calculated and calibrated on an indicating dial in terms of distance. This is approximately 5000 feet-per-second with corrections for sea water density, salinity, and temperature. Sonar is also used in a modified form by aircraft in detecting submarines.

One example of this is the sonobuoy. An airplane drops a sonobuoy into the water where it floats on the surface and releases a water-protected cable terminating in a hydrophone (equivalent of a waterproof microphone) into the water for a depth of several feet. The sounds picked up by the hydrophone modulate a radio transmitter in the sonobuoy which, in turn, radiates the information from the sonobuoy antenna. This signal is picked up like radiotelephone signals by aircraft within a horizon of range.

The basic components of a shipboard sonar system include a driver unit to produce the sound signal to be transmitted, a projector to transmit the signal to the water and pick up the sound signals from the sea, a receiver-amplifier which amplifies these signals, and indicating equipment which gives the range of the target which reflected the outgoing signals. The bearing of such signals is determined by rotating the projector back and forth for maximum indication. A dome protects the projector and prevents water noise. Retracting gear hoists and lowers the projector as well as trains or rotates it in order to determine the direction of the sound. The receiver-amplifier, the indicating equipment, and controls are grouped together in an assembly called the "stack" which is located near the maneuvering controls of the vessel. Auxiliary equipment such as the BDI (bearing deviation indicator) and the attack plotter facilitate the use of sonar information in tactical applications. The driver is located close to the projector and retracting gear in order to keep the leads to the projector short. It is remotely controlled from the "stack." The projector is, of course, under water. When the projector is in operating position it extends beneath the keel of the vessel so that the sound beams may be directed in any horizontal direction without obstruction by the ship itself. Placing the projector a substantial distance below the keel helps to avoid interference produced by the noises of the ship itself. The retracting gear, mounted on a sea chest, is built into the hull of the ship. It raises the dome into the sea chest for protection when there is danger of damage by underwater obstructions or heavy seas. The motors for operating the retracting gear can be controlled from either the stack location or from the lower sound room. Extraordinary problems may arise from the fact that the projector dome protrudes below the vessel. Often submerged objects or even large fish collide with the dome, damaging it or puting it entirely out of commission.

Other applications of electronic equipment as used by the Navy include the radio gear carried by a Navy PBY patrol bomber of the Catalina type. See Fig. 9. Such craft did effective work in rescuing pilots and crews of other planes shot down or forced into the sea by engine trouble. They were also used to good advantage in patrolling missions and in flashing radio intelligence to other naval units.

Fig. 8 is a high frequency direction finder on an aircraft carrier. This unit is used for locating the source of high frequency radio transmissions. It proved particularly useful in pinpointing the exact location of any submarine using high frequencies to transmit to other such craft. The information picked up by this equipment is then used to dispatch ships and aircraft to the scene for appropriate action.

Fig. 11 is a photograph of the "Loon," one of the many guided missiles whose operation is dependent on electronics. The word "guided missile" is replacing the term "pilotless aircraft." It is an aircraft without a human pilot whose functions have been replaced by electronics. In addition to not jeopardizing a human life, the guided missile is faster in response than human endurance and reaction time would otherwise permit.

Fig. 10 shows a simple infrared unit used for communication by means of invisible light. Its ability to function with light waves that are invisible to the naked eye (electromagnetic frequencies lower than 375,000,000 megacycles) permits secret communication, particularly at night. This technique was used on most of the major fleet units at the time of the Mariannas campaign in World War II. Subsequently these units have been installed on all surface ships of the active fleet. Special filters and hoods have been developed to convert the standard Navy blinker light into an invisible light. These filters screen out all but the infrared component, thus the transmission is invisible to any observers except those equipped with specially-designed infrared receivers.

Technical officers and enlisted technicians in our modern Navy are receiving training and experience with all of these diversified types of electronic equipment. The training they are getting would be virtually impossible to

(*Continued on page* 82)

Fig. 11. A guided missile is launched at the pilotless aircraft base of Naval Air Missile Test Center, Point Mugu, Cal. Guided missiles are high on the research priority list.

VERSATILE EQUIPMENT Key To Good Recording

By
WILLIAM MILLER
General Recording Manager
Capitol Records, Inc.

Engineer John Kraus inspects an LP during cutting process. Note automatic head lifting mechanism at rear of cutting head pivot.

Flexible recording studios and a variety of modern cutting equipment characterize Capitol's operation.

FLEXIBILITY is the keynote of all recording and dubbing operations at the Hollywood recording studios of *Capitol Records, Inc.* Shown on this month's cover in Studio C with engineer John Block at the controls, is vivacious singing star Margaret Whiting, as she records her song hits, "Over and Over and Over" and "The Moon Was Yellow." Besides frequent recording sessions, the popular gal singer, who has won "Top Vocalist" awards for the past five years since her disc of "It Might As Well Be Spring" was released, is heard twice weekly on a network radio show with Jack Smith.

In explaining the versatility of all the studios and equipment used on a *Capitol* recording session, first, one of the four available studios is selected by agreement between the musical producer and the recording department manager, according to orchestra size, whether it is vocal or instrumental, etc. After an agreement is reached on studio, type of pickup and placement and over-all sound needed, the microphones for the job are then picked from the seven available types. In the case of this particular Margaret Whiting session, the *Stephens* MI-CIC microphone was chosen for its extreme cleanness throughout the entire range, and for its absence of "pops" on certain letters such as "p" in the lower frequencies.

All original recording is done on *Ampex* tape machines. The studios are equipped with four of the 200 series (large, custom-built models) and three of the 300 series (small, broadcast type). After the number has been recorded, the original tapes are intercut according to the producer's direction, and a final "A" tape is placed on the storage reel ready for dubbing. Since *Capitol* produces a great part of its catalogue on all three speeds, special tapes must be assembled from the originals with proper pauses or spacing for the LP 33⅓ r.p.m. sides, which of course run from 12 to 26½ minutes for a single side.

The console, (see cover) one of the two custom-built for *Capitol* by Art Davis of *Cinema Engineering*, has a very desirable feature; i.e., eight of its ten channels can be either boosted or attenuated nine db. at the high or low end. This feature alone is one of the most versatile aids in getting any desired sound, and is extremely valuable for music, vocals, or sound effects.

To the left of the console but not shown are the eight channels of echo which control the mixer output to the speakers in one or both of the two specially constructed echo chambers located on the roof of the building.

(*Continued on page* 109)

General view of Capitol Record's dubbing room No. 2 showing two Scully lathes tied together (by means of the dural bar at rear of lathes) for producing two identical processing masters simultaneously. These machines normally produce LP's and are equipped with semi-automatic groove deepeners and automatic head lift at master tail out.

TV Receiver Conversion for Velocity Modulation

By
M. A. HONNELL
and
M. D. PRINCE
Georgia Institute of Technology

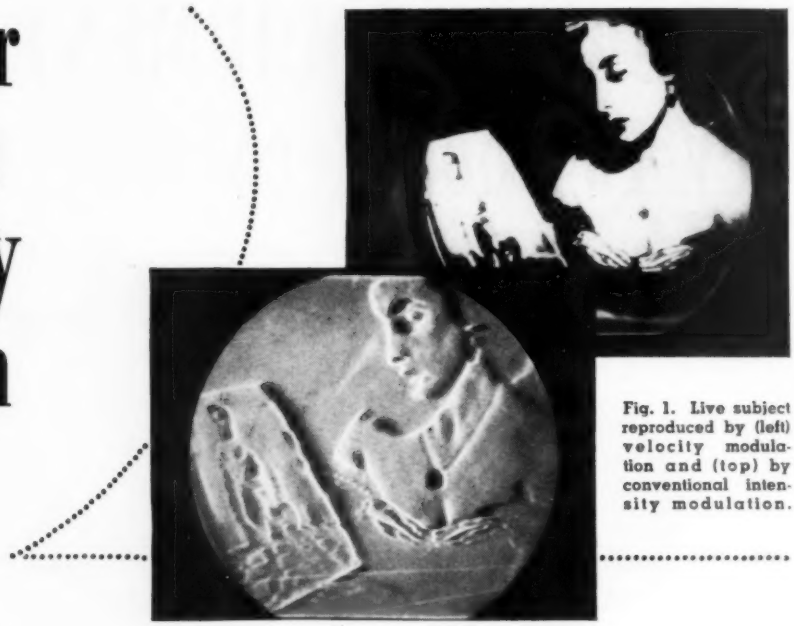


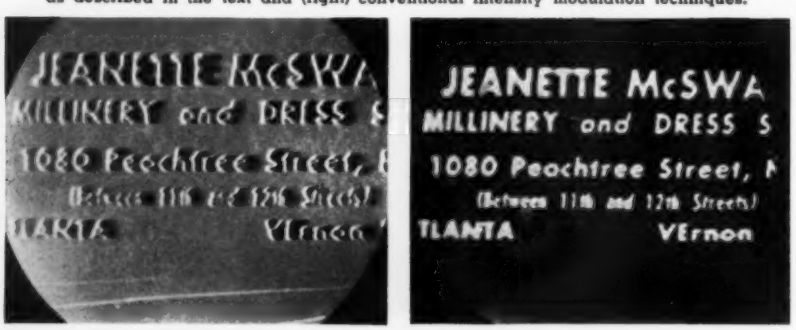
Fig. 1. Live subject reproduced by (left) velocity modulation and (top) by conventional intensity modulation.

By merely adding a single switch and a few wires any electrostatic deflection type set can be converted.

ALTHOUGH the operating principles of television systems are now well established, in the early stages of the art a television system was developed which operated quite differently from those in use today. Prior to the perfection of the modern high-vacuum kinescope, the early gas-filled version of the cathode-ray tube was incapable of adequate grid control. In view of this fundamental limitation, the idea was conceived of operating the cathode-ray tube with constant beam current and applying the video voltage to the horizontal deflection circuit so that the picture information was supplied by changes in the horizontal scanning velocity of the fluorescent spot on the screen of the cathode-ray tube. This deflection-modulation principle was first proposed by Boris Rosing, a Russian teacher, in 1911, and a satisfactory working system was demonstrated by the German scientist, Von Ardenne, in 1931. Later, in 1933, the British workers Bedford and Puckle perfected an ingenious system which utilized a combination of deflection-modulation and intensity modulation.[1] Following this period the field of deflection-modulation lay dormant; beam-intensity modulation had proved more advantageous and was developed to its present state of perfection. However, this field was recently reopened when research by the authors revealed that standard television programs transmitted by commercial stations could be reproduced with unusual results by use of deflection-modulation. A description of this work and a basic analysis of the underlying principles was presented to the 1950 National Convention of the Institute of Radio Engineers. In this present article, the circuitry is described and receiver modifications are shown so that the amateur experimenter can demonstrate this deflection-modulation reproduction on his own television set.

[1] Deflection-modulation is customarily referred to as "velocity modulation" since the lateral velocity of the scanning spot is modulated in the horizontal direction. Unfortunately, however, the term "velocity modulation" has also gained acceptance in an entirely different sense, as the "velocity-modulated" klystron tube. When used with this latter meaning, it applies to the change in velocity of the electrons in the electron beam itself, such as would be produced by modulating the second-anode voltage in a cathode-ray tube.

Fig. 2. An example of printed material as reproduced by (left) velocity modulation as described in the text and (right) conventional intensity modulation techniques.



This discussion is confined to the consideration of an electrostatic-deflection receiver, although deflection-modulation has also been demonstrated in the laboratory using magnetic deflection. However, since the high-voltage is usually obtained by flyback pulse rectification, the conversion of a magnetic-deflection receiver is not recommended. In a receiver employing this type of power supply, any video signal inserted in the deflection circuit interacts with the anode voltage and causes distortion of the picture raster.

The conversion of a *National* type NC-TV7M electrostatic-deflection receiver will now be considered in detail. The diagram shown in Fig. 3 illustrates the modifications which provide deflection-modulation reproduction. When the two-position switch S_1 is in position 1, the circuit operates in the usual manner, in which case the video signal is coupled from the video amplifier V_8 through coupling condenser C_{31} to the cathode of the kinescope. It is to be noted that in this receiver the kinescope is cathode-driven.

When the switch is in position 2, the receiver is converted to velocity modulation reproduction. In this mode of operation, the video signal is removed from the kinescope circuit by opening the video signal lead immediately to the right of C_{31}, and is then connected to the horizontal-deflection amplifier V_{11} through a small condenser C_a. This adds the video signal to the saw-tooth sweep voltage so that it is amplified along with the normal horizontal sig-

nal. Due to the amplification provided by the sweep amplifier, a value of C_a on the order of 3 $\mu\mu$fd. provides ample coupling between the video and deflection circuits. This value is not critical and a capacitance of 1 to 10 $\mu\mu$fd. will prove satisfactory. This capacitance may be provided by twisting together several inches of insulated wire.

Since the kinescope beam current is no longer modulated by the video signal some other reasons must be provided for blanking the kinescope spot during the time required for retrace. During the vertical retrace period the spot is readily blanked by coupling the vertical sweep signal from V_{12} through C_b into the kinescope cathode circuit. A value of $C_b = 1000$ $\mu\mu$fd. was found satisfactory although the optimum value depends upon the receiver and can best be determined experimentally. The horizontal retrace lines were not objectionable so blanking was not provided for them. If the capacitance C_b is omitted, the velocity-modulated image will still be produced although the vertical retrace lines will be visible.

It will now be instructive to consider the magnitude of video signal required to produce a deflection-modulated picture. Let us assume that the 7JP4 kinescope requires a peak-to-peak voltage of 800 volts for full horizontal deflection. Since a velocity-modulated image is produced by spot excursions on the order of one spot width, which corresponds to approximately 1/1000 of the raster width, a video signal voltage on the order of $(800)/(1/1000) = 0.8$ volt on the deflection plates will produce the desired image. If the deflection amplifier has a gain of 18, the desired voltage on the deflection plates is supplied by a voltage of $0.8/18 = .044$ volt on the grid circuit of the deflection amplifier.

By following the suggestions in this article, the experimenter will find that deflection modulation is capable of reproducing printed material and line drawings with acceptable legibility, although it does not achieve the fine contrast gradation produced by conventional television systems. A consideration of possible applications indicates that deflection modulation may offer some advantages for specific industrial and military applications due to its unique presentation of the subject matter. Furthermore, the possibility of circuit economy should be considered, since the numerical example worked out in a previous section indicates that the required video signal is of such a small magnitude that it could easily be obtained directly from the video detector, thus eliminating the video amplifier in the receiver.

The preceding discussion naturally suggests the possibility of combining conventional beam modulation with deflection modulation in a television receiver. This type of presentation has been investigated in the laboratory and can easily be demonstrated on a receiver of the type shown in Fig. 3. This is accomplished by leaving the video signal lead connected to the kinescope circuit as in normal operation and at the same time coupling the video signal through C_a to the horizontal deflection amplifier to produce the velocity modulation. The images produced by this modified circuit exhibit an outlining edge on one side of bright objects and adds a crispness to the picture which seems to improve the apparent resolution.

Deflection modulation is of further importance from a standpoint of standard receiver performance due to the fact that stray capacitances may exist in a conventional television receiver and produce some degree of spurious deflection-modulation in combination with the conventional presentation. In other words, due to faulty receiver design or failure of component parts, an undesired deflection-modulation image may be superimposed on the regular television picture, thus causing some positional distortion and loss of contrast. This type of distortion may result in a halo effect similar to that caused by overshoot in the video section, or by ghost images caused by reflections and may therefore be improperly diagnosed.

Research in the laboratories and by the experimenter may reveal additional points of interest since the full implications of the combination of deflection modulation with beam modulation are not completely apparent at this date.

The writers are grateful to the Engineering Experiment Station at Georgia Tech for its financial support of the investigation of deflection-modulation television systems.

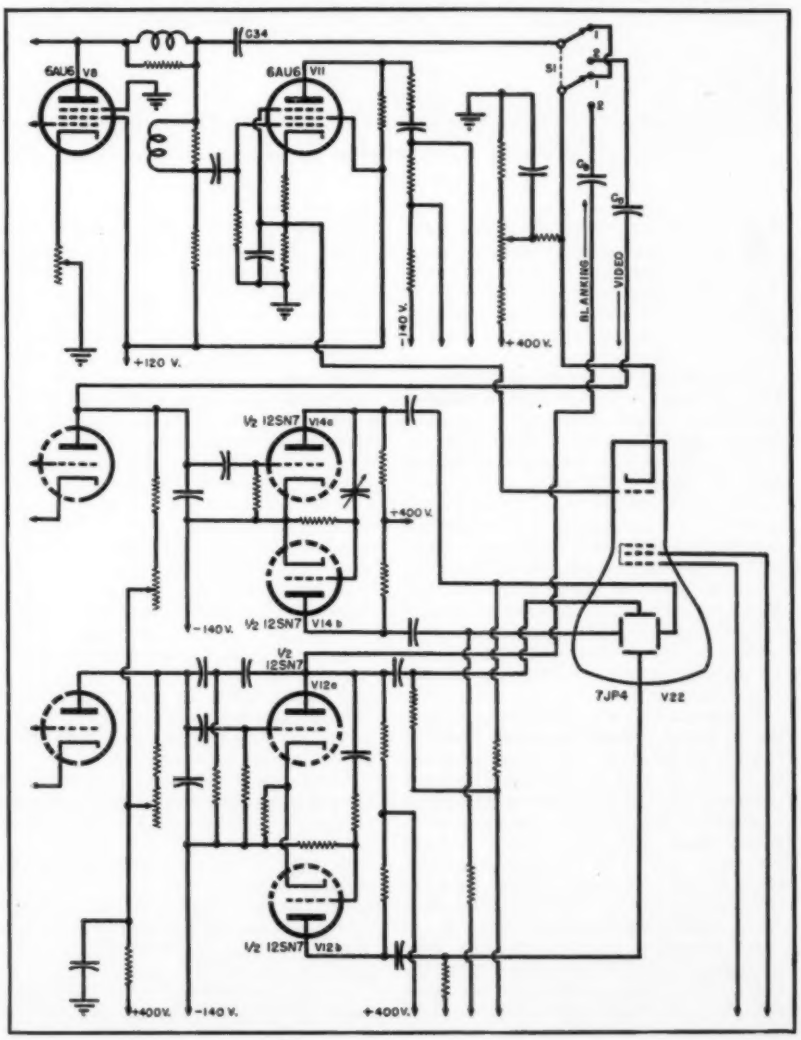
REFERENCES

Wilson, J. C.; "Television Engineering," Pitman and Sons, Ltd., London, p. 102, 1937.

Zworykin, V. K. and Morton, G. A.; "Television," Wiley & Sons, Inc., New York, p. 238, 1940.

-30-

Fig. 3. Circuit diagram showing modifications of an electrostatic deflection receiver required to provide deflection modulation reproduction. When switch S_1 is in position 1, the receiver operates in the normal manner. When S_1 is in position 2, receiver is converted to deflection modulation reproduction. The only changes involved in converting the receiver are those connected directly with the switch.



NEW FCC HAM RULES

By
RAY FRANK, W9JU
Associate Editor
RADIO & TELEVISION NEWS

Newly-created Novice and Technician classes of licenses open ham radio to more hobbyists.

THE long-awaited changes in the ham regulations became a reality on January 31, 1951 when the FCC adopted the revised rules. The proposal to revise the rules caused much speculation and some controversy in ham circles.

Probably of greatest interest to a large number of prospective amateurs are the provisions establishing the new Novice and Technician classes of licenses. These new categories open the field of ham radio to a large, new group of operators.

On April 21, 1949 the FCC published a notice of proposed changes in amateur rules, an announcement which was the cause of much comment, pro and con. As a result of the widespread interest, an informal conference attended by interested parties was held at the FCC offices on October 10 and 11, 1949.

Representing the organized amateurs were delegates from ARRL, NARC, and SARA. NARC and SARA, in spite of widely divergent views, resolved their differences and agreed to support the League. There were a great many comments on the various proposals and the meeting was concluded with a feeling that the rules, if revised to remove objectionable features, would have general support.

An amended set of proposals was published by the FCC on November 16, 1949. The ARRL asked for an oral argument on these new proposals and this meeting was held on June 2, 1950, attended by NARC, SARA, ARRL, and many of those who had appeared at the previous meeting. Several points were discussed at length including the wording of Section 12.0 dealing with basis and purpose, as well as the provision for a new class of license to be known as "Amateur Extra Class."

The revised regulations, as finally adopted by the FCC, are summarized below. Commissioners George Sterling, W3DF, and Frieda Hennock dissented in part with the wording of 12.0 and the provision for the Amateur Extra Class license, as well as the Commission's failure to provide for greater use of NBFM in the phone bands.

These new rules became effective March 1, 1951 except as noted. A brief outline of the major provisions of the new regulation is given below:

12.0 *Basis and Purpose.* These rules and regulations are designed to provide an Amateur Radio Service having a fundamental purpose as expressed in the following principles:

(*a*) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

(*b*) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(*c*) Encouragement and improvement of the amateur radio service through rules which provide for advancing skills in both the communication and technical phases of the art.

(*d*) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

(*e*) Continuation and extension of the amateur's unique ability to enhance international goodwill.

License Classes Revised

The following revisions were made in the license classifications.

Amateur Extra Class—Available Jan. 1, 1952.

Advanced Class—(Previously Class A). No new Advanced Class licenses will be issued after Dec. 31, 1952.

General Class—(Previously Class B). Effective March 1, 1951.

Conditional Class—(Previously Class C). Effective March 1, 1951.

Technician Class—Effective July 1, 1951.

Novice Class—Effective July 1, 1951.

Classes and Privileges

The new classifications and the privileges accorded each class of operation are as follows:

Amateur Extra Class: All authorized amateur privileges including such additional privileges in both communication and technical phases of the art which the Commission may consider as appropriately limited to holders of this class of license.

Advanced Class: All amateur privileges except those which may be reserved to holders of the Amateur Extra Class license.

General and Conditional Classes: All authorized amateur privileges except the use of radiotelephony on the frequency bands 3800 to 4000 kilocycles, and 14,200 to 14,300 kilocycles, and except those which may be reserved to holders of the Amateur Extra Class license.

Technician Class: All authorized amateur privileges in the amateur frequency bands above 220 megacycles.

Novice Class: Those amateur privileges as designated and limited as follows: The d.c. plate power input to the vacuum tube or tubes supplying power to the antenna shall not exceed 75 watts, crystal-controlled, on the following frequency bands: 3700 to 3750 kilocycles, and 26.960 to 27.230 mc. radiotelegraphy using only type A1 emission. 145 to 147 megacycles, radiotelegraphy or radiotelephony using any type of emission except pulsed emissions and type B emission.

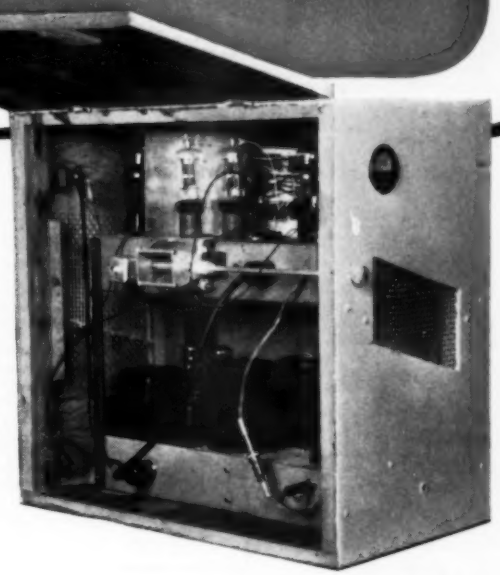
An amateur operator license, except

(*Continued on page* 111)

A Carrier CURRENT TRANSMITTER

By
JOHN GORT
Engineer, Station KWOA

Complete construction details on a practical unit which may be operated by laymen without license.



Over-all view of the home-built carrier current transmitter. The unit uses 5U4's to eliminate a two-step operation in putting the transmitter into service.

CARRIER current transmission development was given a real impetus because of the restrictions on radio communications that were in effect during World War II.

The system described in this article was developed for a church whose membership included a large number of persons who were unable to attend services due to illness or the infirmities of old age. Originally these people were served over telephone company lines which were connected from the public address system in the church to the various homes. When the telephone company put all their cables underground and no longer wanted to carry this high audio level material through these cables, it was necessary for the church to seek some other means of transmitting the services to the shut-ins.

When the author was approached by the church committee, various solutions to their problem were considered and discarded. A short-wave transmitter would require the services of a licensed engineer whenever the station was on the air. Citizens Radio service equipment is still in the experimental stage and would, in addition, require a separate high frequency receiver in each of the homes. This requirement would place an unnecessarily heavy financial burden on the church's shut-in members, most of whom were in the low-income bracket and not in a position to make such an investment.

After considering and rejecting these ideas, it was decided to try carrier current transmission. To test the practicality of such a scheme a "haywire" experimental unit was built using a 6L6 modulated oscillator, modulated by a pair of 6V6's, push-pull driven by a 6SJ7.

A check of reception in various places in the different homes led us to believe that such a plan was feasible and work was begun on a permanent unit. The unit is a m.o.p.a. using a 6L6 as a crystal-controlled oscillator, driving push-pull 807's in the r.f. final. These are modulated by a pair of 6L6's which are driven by a 6C5. A 6J5 is used as the audio input. This unit gives a coverage of about one-half mile radius.

Perhaps at this time a resumé of FCC rules and regulations pertaining to carrier current equipment would be in order.

"*SEC.* 15.2. *Apparatus excepted from requirements of other rules.* With respect to any apparatus which generates a radio frequency electromagnetic field functionally utilizing a small part of such field in the operation of associated apparatus not physically connected thereto and at a distance not greater than $157{,}000/f_{kc.}$ feet (or $\lambda/2\pi$) the existing rules and regulations of the Commission shall not be applicable, provided:

"(a) That such apparatus shall be operated with the minimum power possible to accomplish the desired purpose.

"(b) That the best engineering principles shall be utilized in the generation of radio frequency currents so as to guard against interference to established radio services, particularly on the fundamental and harmonic frequencies.

"(c) That in any event the total electromagnetic field produced at any point a distance of $157{,}000/f_{kc.}$ feet (or $\lambda/2\pi$) from the apparatus shall not exceed 15 microvolts per meter.

"(d) That the apparatus shall conform to such engineering standards as may from time to time be promulgated by the Commission.

"*SEC.* 15.3. *Exceptions: interference to radio reception.* The provisions of sections 15.1 and 15.2 shall not be construed to apply to any apparatus which causes interference to radio reception."

As can be seen from the formula, $157{,}000/f_{kc.}$ feet, the lower the working frequency the greater the distance for a level of 15 μv./m., which of course would allow greater power output. In this respect the 200 kc. to 400 kc. band would allow the greatest coverage. However, in this instance that would require separate receivers or low frequency converters in all the homes. To avoid this expense, the broadcast band was chosen. Our choice was 690 kc. as there were no stations operating at this frequency anywhere in the vicinity. A radio log of stations is a big help in setting up the spot on the dial.

The problem of carrier current transmission breaks down into three separate problems.

1. Frequency stability and the matter of not exceeding the permissible power output level of 15 μv./m.
2. Coupling r.f. energy into the line.
3. Line attenuation and coupling.

In building the transmitter it is best to start with the power supply. As

can be seen from the schematic (Fig. 1), separate high voltage and filament transformers are used. There is no special reason for this except that these electrostatically-shielded transformers were available on the surplus market. For good regulation, a choke input filter system was chosen. An 8 μfd. electrolytic condenser could have been used, however we chose oil-filled units in order to reduce the possibility of breakdown.

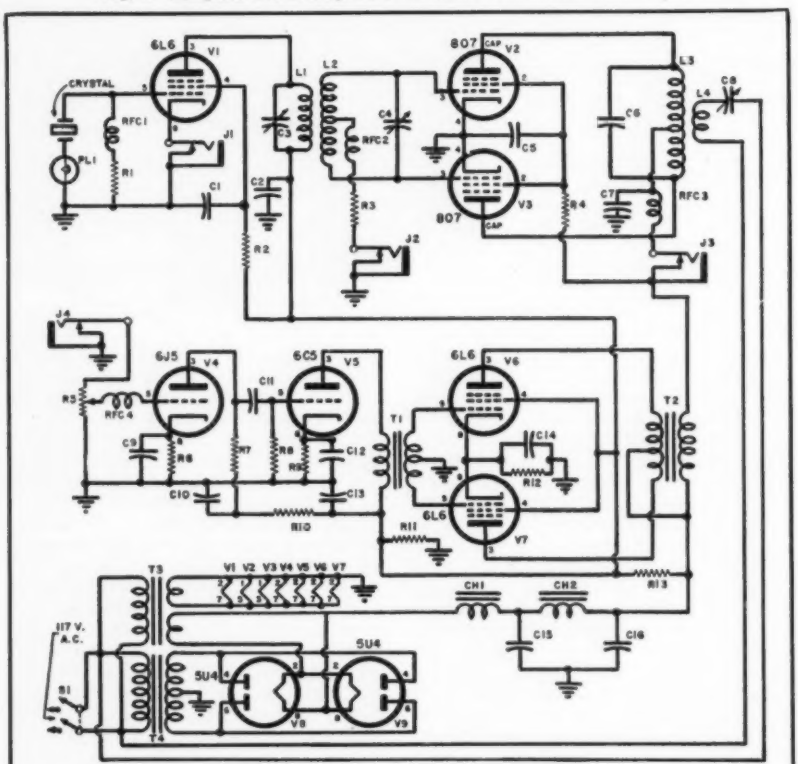
Due to the high current drain and in order to eliminate the need for a separate transformer for the 866A's (there is another reason we will go into later), two 5U4G's are being used in parallel. One tube can be used but that works the tube at about maximum ratings and an approximate 10 volt drop in the output voltage results.

The audio circuit is straightforward and should give no trouble. On the input we tried using an electrostatically-shielded line to the grid transformer and got a terrific hum that had us baffled until we removed the transformer and used the circuit of Fig. 1.

The reasons for the 2.5 mh. r.f. choke in the grid of the 6J5 is to reduce r.f. pickup due to the r.f. field around the transmitter. The line from the public address system in the church is isolated from the equipment by an isolation transformer.

The circuits shown do not include a volume compressor. However, a simple volume compressor, as described in the article "An Electronic Loss Compressor" (November 1950 issue) would be advantageous. The 807's were chosen because they didn't require neutralization, operating push-pull to eliminate the 2nd harmonic.

Fig. 1. Complete circuit diagram of the carrier current transmitter unit.



R_1—20,000 ohm, 2 w. res.
R_2—50,000 ohm, 1 w. res.
R_3—20,000 ohm, 1 w. res.
R_4—15,000 ohm, 10 w. wirewound res.
R_5—1 megohm pot
R_6—1500 ohm, 1 w. res.
R_7—220,000 ohm, ½ w. res.
R_8—1 megohm, ½ w. res.
R_9—1000 ohm, 1 w. res.
R_{10}—47,000 ohm, ½ w. res.
R_{11}—20,000 ohm, 25 w. wirewound res.
R_{12}—250 ohm, 10 w. wirewound res.
R_{13}—2000 ohm, 10 w. wirewound res.
C_1, C_9, C_{11}—.01 μfd., 600 v. cond.
C_2, C_4—250 μμfd. var. cond. (Johnson Type 250 H15)
C_5, C_7—.002 μfd., 2500 v. mica cond.
C_6—200 μμfd., 1500 v. mica cond.
C_8—244 μμfd. var. cond. (Johnson Type 250 E20)
C_{12}—25 μfd., 25 v. elec. cond.
C_{10}, C_{13}—8 μfd., 450 v. elec. cond.
C_{14}—10 μfd., 25 v. elec. cond.
C_{15}—10 μfd., 50 v. elec. cond.
C_{15}, C_{16}—8 μfd., 600 v. oil-filled cond.
S_1—D.p.s.t. sw.
PL_1—60 ma. #48 pilot lamp
RFC_1, RFC_2, RFC_4—2.5 mh. r.f. choke
RFC_3—2.5 mh., 250 ma. r.f. choke
J_1, J_2, J_3, J_4—Closed circuit jack (Mallory A2A)
T_1—Interstage trans., single or p.p. pri. to p.p. grids, 3:1 over-all ratio (Thordarson T20A19)
T_2—Mod. trans., p.p. 6L6's, 6600 ohm pri. to 4000 ohm load (Thordarson T21M54)
T_3—Fil. trans., 5 v. @ 6 amps.; 6.3 v. @ 6 amps.
T_4—Plate trans. 380-0-380 v. @ 305 ma.
CH_1, CH_2—4.2 hy., 300 ma. filter choke
L_1—60 t. #22 en. closewound on 3½" form
L_2—60 t. #22 en. closewound on 3½" form, half on each side and spaced ⅛" from L_1
L_3—60 t. #18 en. closewound on 3½" form, center-tapped
L_4—Output link of #18 rubber covered wire, over center of L_3 (See text)
1—Crystal for operating freq. (See text)
V_1, V_6, V_7—6L6 tube
V_2, V_3—807 tube
V_4—6J5 tube
V_5—6C5 tube
V_8, V_9—5U4 tube

The 60 ma. #48 bulb in series with the crystal is to keep excessive currents from damaging the crystal since the bulb will burn out before the crystal is damaged.

The jack in the cathode of the oscillator is used to measure total stage currents which should read about 15 ma. at resonance. The oscillator tank coil consists of 60 turns of #22 enamel wire. No buffer stage is used but its use would increase the stability of the oscillator. The grid windings for the 807's are split, one half on each side of the oscillator tank, center-tapped, with the center tap grounded through a 2.5 mh. choke and a 20,000 ohm resistor. Here again a jack is provided for measuring the grid drive, which should be about 5 ma. at resonance. Bias on the 807's should be about —90 volts.

All windings are on 3½ inch cardboard forms. We used quart ice cream cartons which worked very well. They should be varnished or shellacked a couple of times before using. To prevent interaction between coils, they should be mounted at right angles. However, due to the small space available, we mounted ours vertically and put a metal shield between the oscillator tank and the 807's and final tank.

The final tank is 60 turns of #18 enamel wire closewound, with 30 turns on each side of the center tap. The coupling link (L_4 in Fig. 1) to the 115 volt line is a few turns of rubber covered wire wound around the center of the coil which is the "cold" part of the coil. The exact number of turns depends on the 115 volt house circuit and the correct coupling will have to be found by experiment.

The jack in the plate circuit is used when measuring plate current and checking circuit resonance. The meter should read about 27 ma. at resonance. By using jacks in different circuits only one meter is needed. This may be mounted on the outside of the cabinet and used to tune the final. A d.p.d.t. polarity-reversing switch is used when measuring the current in the grids to the 807's as the polarity is reversed there. As grid leak bias is used, a lack of excitation voltage from the oscillator produces no grid current or voltage for the 807's.

The reader may wonder why fixed condensers were used in the final tank and how the tank can be tuned to resonance. The coupling of r.f. energy to the line can be accomplished in different ways. Fixed condensers can be used. Experiments with different sizes of condensers will be necessary to determine the correct size as the capacity required will depend on the frequency chosen, the line load, etc.

Various methods of coupling to the line are shown in Fig. 2. In all cases C_3 serves to isolate and tune the line circuit. L_5 should be tapped, or the number of turns varied by experiment, in order that the coil can be correctly tuned to the line. Due to changing line loads, we are using a different method which will be discussed later. Perhaps it should be mentioned here that it is

illegal to couple to the line side of the meter. It is only permissible to couple to the load side of the meter. The electric meter is a shunt to the r.f. energy but that cannot be avoided. To avoid the shunting effect of the lighting and power load across the line a parallel-tuned circuit (L_2-C_3 in Fig. 2C) is connected in series with the load side of the line.

No exact specifications can be given for the coil L_2 as it will be necessary to wind this coil with wire heavy enough to carry the entire load. The needed inductance will also be determined to some extent by the transmitter frequency.

In most cases there is a relatively low voltage developed across this circuit so the condenser C_2 (Fig. 2C) may be of the ordinary broadcast receiver type.

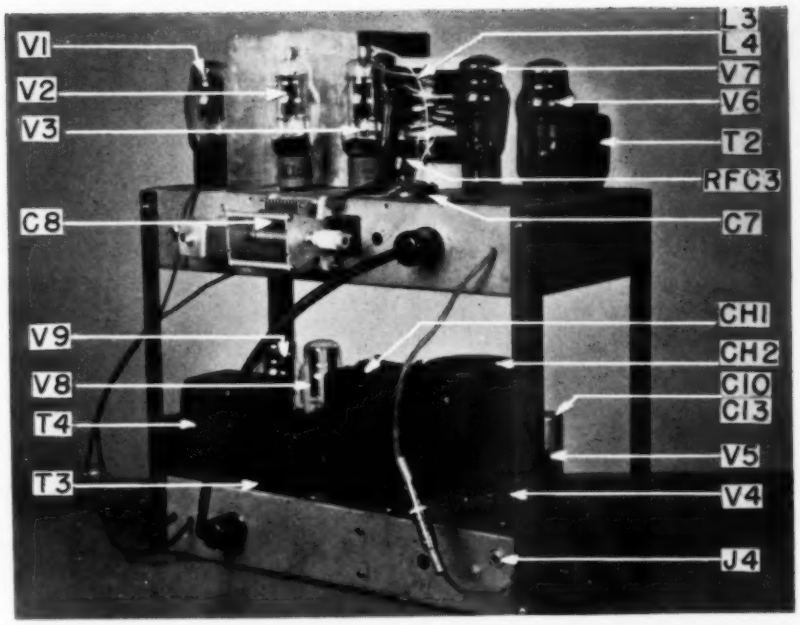
Due to the changing line loads from day-to-day and night-to-day, we decided to couple one side of the link to the 115 volt line and the other side through a variable condenser (C_5 in Fig. 1). In this way it was possible to compensate for the differences in the line load and at the same time tune the final tank by varying the reflected load. A variable condenser could have been used in the final tank circuit but such an application would require the use of a high voltage variable component and add an unnecessary tuning operation.

The second harmonic (1380 kc.) was strong enough to be troublesome so a series-tuned wave trap tuned to this frequency is used. It is connected from the 115 volt line side of the variable coupling condenser to neutral or ground. It is not shown in the diagram as it isn't required in all cases.

Our original plan called for the transmitter to be installed in the church. This idea was abandoned, however, due to the shunt effect of the lighting circuits and motors operating in the church. Since the church was located at some distance from the homes of those who would receive the transmission, it was decided to locate the transmitter in a more centrally located private home and run a remote line from the church p.a. system to the r.f. unit. This line must be balanced and an isolating transformer, the telephone company calls them repeating coils, should be used. For the protection of the equipment, lightning arresters should be used.

In order to tune the unit the 0-200 ma. meter is left in the final stage and a shaft on an insulated coupling is brought outside the cabinet so the operator can tune the final for resonance by noting the readings on the meter.

Now for the additional reason for not using 866A's. As these units were designed to be used in private homes and were to be operated by persons with no specialized knowledge of electronics, the requirement of a time delay between the application of the filament voltage and the high voltage had to be considered. Rather than entrust this two-step operation to inexperienced persons we chose 5U4's which don't require the time delay.



Over-all view of the transmitter with cabinet removed to show construction details.

The transmitter cabinet was constructed of plywood. Openings were left in the top and on the sides to permit ventilation. These openings were covered by ¼ inch mesh screen to keep inquisitive fingers out of the "innards". The door is hinged and equipped with a lock to prevent unauthorized access to the transmitter.

In the matter of line attenuation and coupling it should be realized that attenuation occurs in any line and that there is a tremendous loss in the transfer of r.f. energy in a power transformer designed for the power frequencies. If condensers could be used between the primary and secondary terminals of the transformer, the r.f. would have a low resistance path. This is done on some power lines to permit communication by linemen and in such cases it works very well. In our case this technique was not practical. When we hit a "dead spot" where the signal level was too low to work, we installed an outdoor long-wire antenna in parallel with the power lines feeding the house and carrying the r.f. energy we wanted. This increased the signal pickup at the receiver to a satisfactory level.

The mechanical arrangement of parts can be clearly seen in the photographs. The reader should note the interstage shield between the oscillator tube and tank coil and the r.f. final.

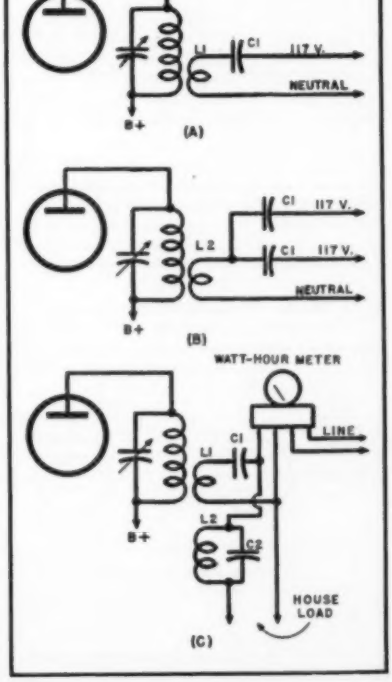
The transmitter is built on two 7x 17x3 inch chassis. The lower chassis carries the power supply and audio stages. The upper chassis houses the r.f. stages and the modulator stage. As shown in the photograph, two separate cables connect the two chassis. The larger of the two cables carries the power and filament wires while the other cable is the shielded lead from the driver transformer on the lower chassis to the grids of the 6L6 modulators on the top chassis.

Tuning Up

Insert the plug of the milliammeter into J_1 and tune for minimum reading.

(*Continued on page* 124)

Fig. 2. Three methods for coupling the transmitter unit to the line. See text for explanation on proper use of these couplings.



SATURABLE REACTORS and CONTROL OSCILLATORS

By
ED BUKSTEIN

Core saturation, normally an undesirable characteristic, is used to control the performance of electrical devices.

CORE saturation, which in many applications is undesirable, provides a key to the solution of a number of industrial electronics problems. These solutions utilize the fact that when the iron core of a coil becomes saturated, the inductive reactance decreases. The physical structure of a saturable core reactor is illustrated in Fig. 1. The inductance, and consequently the reactance, of the a.c. winding depends upon the degree of core saturation. The degree of saturation, in turn, depends upon the value of current flow through the d.c. winding. Thus, by varying the d.c. current, the inductive reactance of the a.c. winding can be controlled.

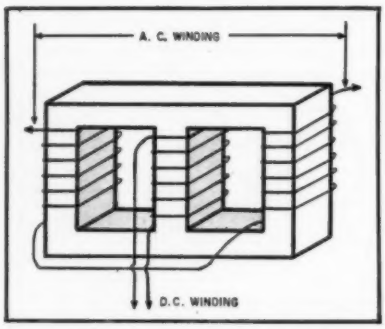


Fig. 1. Winding arrangement of the saturable reactor. The inductive reactance of the a.c. winding can be controlled by varying the current through the d.c. winding.

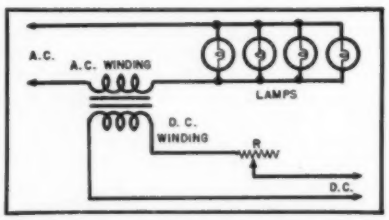


Fig. 2. Light dimming control. When the current through the d.c. winding is decreased the core becomes less saturated. The resultant increase of reactance of the a.c. winding causes the lamps to dim.

Fig. 2 shows a diagram in which a saturable reactor is used as a light-dimming control. This type of circuit is often used in theaters and auditoriums. When the value of the variable resistor R is increased, a smaller value of current flows through the d.c. winding of the saturable reactor. The decreased current lessens the degree of core saturation and increases the reactance of the a.c. winding. The greater reactance limits the current flow through the lamps, causing them to dim.

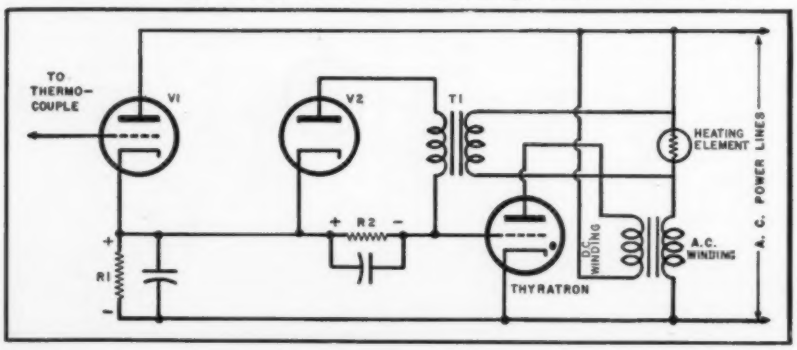
Another application of the saturable reactor is illustrated in Fig. 3. This circuit is designed to maintain a constant temperature in an electric furnace. The heating element of the furnace is connected in series with the a.c. winding of the reactor. The voltage across the heating element is therefore equal to the line voltage minus the drop across the a.c. winding. The d.c. winding of the reactor is connected in the plate circuit of the thyratron. The degree of core saturation is therefore dependent upon the current flow through the thyratron. The grid voltage of the thyratron consists of the voltage across R_1 in series with the voltage across R_2. R_1 tends to make the thyratron grid more positive, and R_2 tends to make it negative. The grid of V_1 receives its bias from a thermocouple located in the furnace.

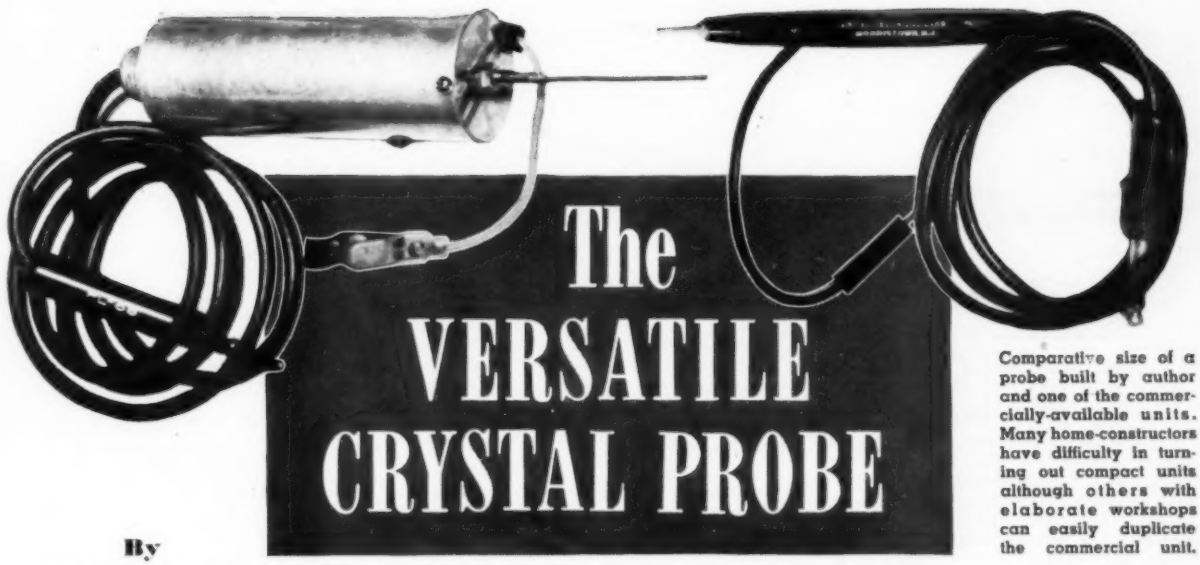
If the temperature of the furnace should tend to drop, the voltage of the thermocouple (bias of V_1) would decrease. As the bias decreases, V_1 draws more current and the voltage drop across R_1 increases. R_1 then supplies a greater positive potential to the thyratron grid. The increased current of the thyratron, passing through the d.c. winding of the reactor, increases the degree of core saturation. When the core becomes more saturated, the reactance of the a.c. winding decreases. The smaller voltage drop across the a.c. winding leaves a greater voltage across the heating element so that the furnace temperature is raised to its original value.

If the voltage across the heating element should tend to increase excessively, transformer T_1 would apply a greater voltage to rectifier V_2. The resultant increase of voltage across R_2 makes the thyratron grid more negative. The thyratron now draws less current through the d.c. winding, and the core becomes less saturated. The reactance of the a.c. winding increases and reduces the voltage across the heating element to its original value.

(*Continued on page* 120)

Fig. 3. Wiring diagram showing how a saturable reactor is used circuit-wise to maintain a constant temperature in an industrial-type electric furnace unit.





The VERSATILE CRYSTAL PROBE

Comparative size of a probe built by author and one of the commercially-available units. Many home-constructors have difficulty in turning out compact units although others with elaborate workshops can easily duplicate the commercial unit.

By
JOHN T. FRYE

Here, in one article, are presented all the practical uses for crystal probes in radio and TV servicing.

SUPPOSE someone offered you a gadget that would give you ten more miles to the gallon when used on your car; wash the dinner dishes in half the usual time if hooked to the kitchen sink; and, when fastened to your TV set, expand your 12½" picture to three-by-four feet. You would eagerly snap up such a bargain that enabled you to obtain so much *extra* benefit from equipment you already owned, wouldn't you? Yet a surprising number of technicians fail to take advantage of an inexpensive little apparatus that will perform equal aiding-and-abetting miracles when employed with standard service instruments now sitting on their benches.

I refer to the crystal diode probe. The technician who builds or buys a couple of crystal probes like the ones pictured and learns how to use them will quickly discover that the usefulness of his v.t.v.m., v-o-m, scope, and service amplifier has been multiplied many times; and he will be able to do things with these familiar instruments that he never dreamed possible before.

Let's consider an example. Suppose a probe having a circuit similar to Fig. 1 is obtained. This particular crystal probe is designed to be used with a v.t.v.m. Condenser C_1 bars the passage of d.c. and allows only a.c. to appear across the germanium crystal. This crystal, being a rectifying device, acts as a short circuit for one-half of any alternating current wave appearing across it but presents a high resistance to the other half. As a result, the voltage appearing across the crystal is in the pulsating form shown in Fig. 2B. This is simply the positive peaks of the waveform of Fig. 2A, and it consists of pulsating direct current. The resistor R, in connection with the usual ten megohm resistance of the

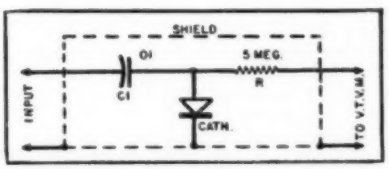


Fig. 1. Diagram of crystal probe designed for use with a vacuum tube voltmeter.

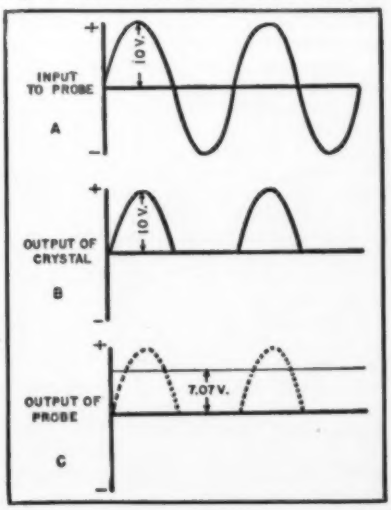
v.t.v.m., serves as a voltage divider so that only approximately .707 of this peak voltage actually appears at the input of the vacuum-tube voltmeter. The distributed capacity of the cable, together with the filtering action of R, serves to smooth out the pulses of current and delivers a steady d.c. voltage to the v.t.v.m. The end result is that the d.c. scales of the v.t.v.m. will now indicate the r.m.s. values of the r.f. voltages presented to the crystal probe.

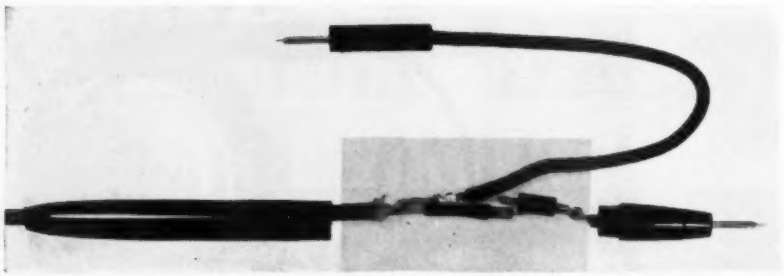
Such a probe will measure alternating current frequencies up to 200 megacycles with an accuracy of plus or minus ten per-cent. Its input capacity is only 3.5 $\mu\mu$fd., and the a.c. input resistance is ¼ megohm at 500 kc., 150,000 ohms at 10 megacycles, and 25,000 ohms at 100 megacycles. This means that the probe can be applied to circuits carrying r.f. currents with a minimum of "loading" or detuning.

The first thing you can do with such a probe and your v.t.v.m. is use *all* of the point-to-point "gain" information given in modern service manuals. Before, you could only measure the gain of the audio stages with your v.t.v.m.; but now, employing the crystal probe, you can actually measure and compare the r.f. voltage on the grid of a tube with that present on the plate. This ability to compare the actual gain of a receiver stage with the normal gain given in the service manuals is of invaluable aid when trying to run down the cause of poor sensitivity in a receiver.

Another important check that can quickly be made is on the operation of the oscillator. To make such a check with a crystal probe you do not actually have to touch the probe to the "hot" portions of the oscillator circuit. It is sufficient merely to bring the probe near the stator of the oscillator tuning condenser, for if the oscillator is operating, enough r.f. can be picked up in this fashion to get a substantial reading on the meter. This method causes no detuning of the oscillator and usually can be performed without

Fig. 2. Waveforms of probe shown in Fig. 1.





Disassembled view of "Klipzon" probe showing how compactness is achieved. The rectangular piece of foil in the final assembly is folded around the unit for shielding.

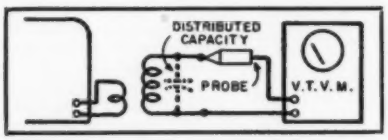


Fig. 3. Wiring arrangement used to check "Q". As mentioned in the text, this method is subject to error and is rather crude when compared with laboratory methods of determining "Q". It does, however, provide the technician with a simplified method of comparing performance of two identical coils.

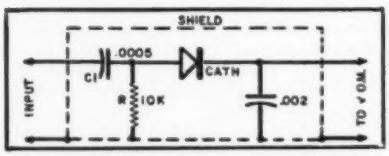


Fig. 4. Wiring diagram of crystal probe intended to be used with any v-o-m of at least 5000 ohms-per-volt sensitivity.

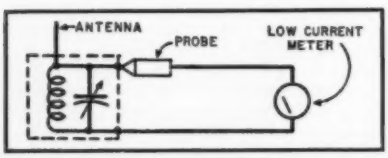


Fig. 5. Circuit diagram of a sensitive and easily-assembled field strength meter for making radio transmitter adjustments.

removing the chassis from the cabinet. Any faltering of the oscillator as the receiver is tuned through the band is instantly shown on the v.t.v.m.

Even the "*Q*" of coils can be roughly measured in the circuit shown in Fig. 3. Here the signal generator is connected to the primary of the coil and the crystal probe is touched to one end of the secondary while the ground lead of the v.t.v.m. goes to the other. Then the signal generator is adjusted for maximum voltage, which will be the resonant frequency of the coil tuned by the various stray capacities. Then the signal generator is moved lower in frequency until the voltage reading is only 71% of the maximum value and the frequency noted. Next the frequency of the generator is increased through resonance and past until the meter again reads 71% of the resonant value. The "*Q*" of the coil is determined from the formula: Coil "*Q*"= the resonant frequency in kc. divided by kc. down from resonance plus kc. up from resonance.

As an example, suppose the coil resonated at 1600 kc., and the downward frequency that gave a 71% reading was 1555 and the upward frequency that gave this reading was 1635. Then the formula would be:

$$Q = 1660/45 + 35 = 20.$$

While admittedly this method is subject to considerable error and is crude when compared with laboratory methods of determining "*Q*," it will give the technician a method of determining coil merit sufficiently accurate for his needs. After a little experience in measuring coil "*Q*" in this manner, the technician will be able to spot quickly a coil whose "*Q*" has been lowered by a shorted turn or a high resistance in the winding.

Quite often the signal generator will not put out enough r.f. voltage to give a satisfactory reading on the meter. In that case I recommend that a broadband r.f. amplifier, such as the one described by Rufus P. Turner on page 78 of the March 1949 issue of RADIO & TELEVISION NEWS, be used either between the signal generator and the coil or between the coil and the probe.

When the amplifier is inserted between the voltage being measured and the crystal probe, the meter reading is no longer the r.m.s. value of the voltage but must be divided by the amplification factor of the amplifier. The amplifier mentioned has an over-all amplification of 85 from sixty cycles to two megacycles; so this means that an r.f. voltage of only five millivolts will produce a reading on the v.t.v.m. of nearly one-half volt.

Such sensitivity makes the amplifier-crystal-probe-v.t.v.m. combination a fine gadget to check the effectiveness of bypass condensers right in the receiver and without disconnecting them. A strong, modulated r.f. signal is run into the receiver and then the input probe of the amplifier is touched to the ungrounded ends of the bypass condensers in both the r.f. and a.f. portions of the receiver. (And it does not hurt to probe the tube shells, grounded lugs, and other parts of the receiver that are supposed to be tied fast to ground, either!) The presence of a signal at any of these points is an indication that something is amiss. This system is the best the writer has found for running down the cause of oscillation and instability in a receiver.

The circuit of Fig. 4 shows a crystal probe that is intended to be used with a v-o-m of at least 5000 ohms-per-volt sensitivity. C_1 again is an isolating condenser, but now the crystal allows one-direction pulses to pass through it and charge the .002 μfd. condenser. This condenser discharges through a current-reading meter connected across the output. Such a probe can be used with a 50, 100, or 200 microampere meter to indicate the presence of r.f. voltage and to indicate changes in this voltage.

It is possible to calibrate such a combination so that the current meter reading will actually indicate a.c. voltage applied to the probe. The method of doing this is given in the article "Extending Multimeter Utility" by Rufus P. Turner in the December 1950 issue (see pages 134 and 136). In practice, however, such calibration is of little value because the input resistance of the combination is necessarily quite low. As a result, it loads heavily any voltage source to which it is applied, and most sources of r.f. voltage —and that is what the crystal probe is ordinarily used to measure—have very poor voltage regulation, consequently, actual voltage readings obtained are likely to be far below the potentials actually present before the probe-meter combination is applied. But the crystal probe and v-o-m can be employed to indicate the presence of an irregular voltage of almost any wave shape and to show any changes in the amplitude of such a voltage. The ability to do this makes it a very handy article around the service shop.

For example, a small 100 or 200 microampere meter connected to this probe through any kind of two conductor cable can be carried up on the roof with you while the probe is connected to the control grid of the video tube of a TV set that is tuned to the station wanted. Then you can rassle the antenna around to your heart's content and see every move immediately reflected in the reading of your little meter. You, all by yourself, can quickly orient the antenna to the optimum position without any short-distance telephone, shouted instructions, etc., to foul up the operation.

The writer, when attacking an intermittent set, likes to hit it with everything he has. For that reason he tries to monitor as many points as possible in the receiver. One of these crystal-probe-and-microammeter combinations is connected to the oscillator section. Another is set across the output of an i.f. stage. The v.t.v.m. is hooked to the a.v.c. bus or across the input of the audio section, and finally the output meter of the v-o-m is connected across the primary of the output transformer. A receiver in such a straight-jacket can hardly make a false move without giving a tell-tale indication on one of these meters. The time and wear-and-tear on your disposition saved by cracking a few intermittents in jig time more than pays for the crystal probes and the extra meters.

If you are a ham, the crystal probe and microammeter can be connected

across a tuned circuit with a short antenna, as is shown in Fig. 5, to make a sensitive and easily assembled field-strength meter for making transmitter adjustments. And, if you replace the meter with a pair of high-impedance earphones, you can easily check the quality of your phone transmitter while it is working into a dummy antenna.

Just an isolating condenser, a resistor and a crystal are needed to make the probe shown in Fig. 6. It can be used with an audio amplifier, or, if you have a very strong local signal, with a pair of sensitive headphones. Since this probe is intended to deliver audio pulses rather than pure d.c., no smoothing filter arrangements are needed and the probe can be reduced to the bare essentials shown.

Such a probe in combination with a high-gain amplifier forms that most modern and efficient of servicing tools —the signal tracer. With it you can follow a signal from the antenna post to the detector, and then, by switching out the crystal, from the detector to the speaker. Any distortion, noise, or variation in signal strength is immediately apparent and can be quickly tracked to its source. Anyone who has ever used the signal-tracing method of shooting trouble long enough to become proficient at it knows that it is one of the quickest methods of running down the more obscure receiver faults, for it enables the technician to check on distortion, noise, and gain all at one fell swoop.

A crystal probe can also be used with your oscilloscope to enable you to *see* the audio portion of the signal at any place you wish to examine it in the r.f. or i.f. part of the set. Since the probe "shucks" the audio portion of the signal out of the r.f. carrier and then feeds this demodulated signal into the scope amplifier, this means that an ordinary oscilloscope that cannot handle signals of much more than 100,000 cycles-per-second through its amplifier can still be used to good advantage in examining the high-frequency parts of the receiver that, without the probe, would be impossible.

A radio frequency signal, modulated by a 400 cycle note such as the ordinary signal generator puts out, can be traced right through the receiver with a probe similar to the one diagrammed in Fig. 6 and any serious changes in this composite signal will be immediately apparent in the distortion of the 400 cycle sine wave being viewed on the scope screen.

An ordinary scope equipped with a crystal probe can also be used for stage-by-stage alignment of TV receivers. With a high-output sweep generator connected to the grid circuit of the preceding tube, as is shown in Fig. 7, and the crystal probe touched to the plate of the tube fed from the secondary of the i.f. transformer, the voltage actually delivered to the scope will be a regularly rising and falling voltage that, when spread out on a linear time base by the synchronized sweep voltage, will indicate the response curve of the i.f. transformer. While the i.f. frequency is likely to be around 25 megacycles, the recurring voltage delivered by the crystal has a frequency equal to the sweep rate, usually either 60 or 120 cycles-per-second, and almost any scope can handle this frequency faithfully.

At first the writer made his own crystal probes. One of his manufacture, housed in an old electrolytic condenser can, is pictured and it works very well. Recently, however, he discovered the "Klipzon" probes manufactured by the *United Technical Laboratories* of Morristown, New Jersey; and he is willing to admit that they manufacture a much neater, more compact, and usable probe than he can make with the materials available to him.

These probes have two especially attractive features: one is a clever tiny clip built right into the probe tip that enables the probe to be clipped to a wire in quarters so close that only the tip itself can be inserted. The other is a needle-sharp point on the tip that can be used to penetrate insulation. These features, plus the fact that the probes are reduced to the size of a fountain pen, make the writer yield the palm to "Klipzon."

Their "V" type probe is intended for use with the v.t.v.m. and has the characteristics described in that connection. It can also be used with a scope or high-gain amplifier for signal tracing. The type "C" can also be used with scope or amplifier, but it is designed for use with a v-o-m of 5000 ohms-per-volt sensitivity or better. The circuit is shown in Fig. 4.

A word of caution should be added lest the probe be damaged by excessive voltage. The series condenser will protect the crystal from d.c. in the circuit but the a.c. is not blocked by this condenser. Care should be taken that the probe is not connected to points where high a.c. voltages are present or the crystal will be ruined.

In general crystal probes should not be used where the a.c. or r.f. voltage exceeds 20 volts r.m.s.

While the author makes no claim to the presentation of anything new or startling in the use of crystal probes in radio and television service work, he is hoping to achieve one goal—namely, stimulating the technician's interest in this versatile aide.

There are still thousands of technicians who are not familiar with the instrument at all while other thousands own such probes but haven't fully explored their possibilities in day-in, day-out servicing jobs.

It is in the hopes of interesting the "have-nots" in trying them and the "haves" in using their probes that this article was written.

In conclusion, the writer is not going to be guilty of uttering that fly-blown saw that "the things that can be done with this device are only limited by the ingenuity of the user," but he will wager that any technician who uses a crystal probe for a couple of weeks will never be without at least one in the shop from then on. —30—

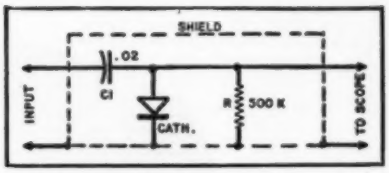


Fig. 6. A condenser, a germanium crystal and a resistor are all that are required in the construction of this probe. It can be used with an audio amplifier, or, if you have a very strong local signal, a pair of sensitive headphones will suffice. This probe, as mentioned in text, is designed to deliver audio pulses rather than pure d.c.

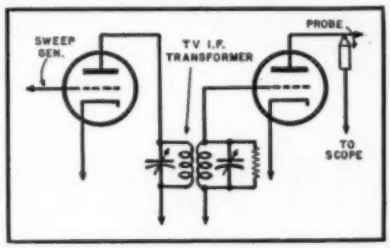


Fig. 7. An ordinary oscilloscope equipped with a crystal probe can be used for stage-by-stage alignment of television receivers.

The crystal probe being used to measure the gain of an i.f. stage in a receiver.

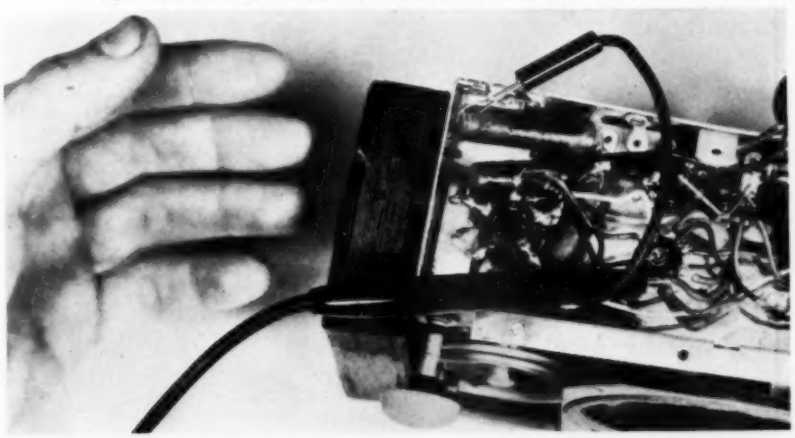


Fig. 1. Phonograph motor board assembly showing the proper mounting position for preamp.

An Improved EQUALIZER-PREAMP

A novel single-tube preamp incorporating a practical equalizer switching circuit.

By
CHARLES P. BOEGLI
Cincinnati Research Co.

A PREVIOUS article[1] described a preamplifier, incorporating a 6SL7GT tube, which is suitable for use with either crystal or magnetic pickups. This unit gives very satisfactory service in conjunction with pickups of relatively high output voltage but it leaves a little to be desired in the way of freedom from hum and noise when used to amplify the output of very low-voltage cartridges. For that reason the design of a preamplifier providing the ultimate in convenience, freedom from distortion, and absence of noise and hum was attempted.

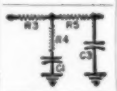
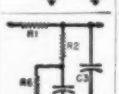
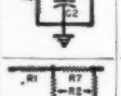
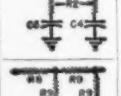
The 12AY7 tube recently marketed by *General Electric* is specifically tailored for low-level audio service.[2] When properly utilized it is superior to ordinary triodes, especially with respect to freedom from hum and microphonics, and it was therefore selected for this application. For low-hum service the two heater sections of this tube are paralleled and connected to 6.3 volts, and for this reason the convenience of using the preamplifier with sets having 6.3 volt tubes is not lost.

Fig. 2 is the circuit diagram of the preamplifier. R is the pickup load resistance specified by the manufacturer of the magnetic cartridge to be utilized, while for most crystal pickups R should be around 15,000 ohms. With a 300 volt "B+" supply the maximum voltage input to each section is 3.5 volts. The signal to the first section is normally so small that distortion in this stage is negligible. The gain of

Table 1. Various equalizer designs and their applications. All popular make discs are covered.

EQUALIZER	CIRCUIT	ACCURATE COMPENSATION FOR	MAY ALSO BE USED FOR
(A) Flat 250 c.p.s.		H.M.V. English Columbia	
(B) Flat 500 c.p.s.		Capitol-Telefunken; most European and earlier American.	H.M.V.
(C) NAB		Capitol; Artist; most late American except RCA, Columbia.	Columbia 78 Columbia 33.3

R_1 is 820,000 ohms or over (see text)
R_2 is 33,000 ohms
R_3 is approximately .8 x R_1
R_4 is 27,000 ohms
R_5 is 5600 ohms
R_6 is 130,000 ohms
R_7 is 18,000 ohms
R_8 is approximately 1.2 x R_1
R_9 is 39,000 ohms
C_1 is .02 μfd.
C_2 is .01 μfd.
C_3 is .003 μfd.
C_4 is .001 μfd.
C_5 is .006 μfd.
C_6 is 250 μμfd.

EQUALIZER	CIRCUIT	ACCURATE COMPENSATION FOR	MAY ALSO BE USED FOR
(D) Columbia 78		Columbia 78	
(E) Columbia 33.3		Columbia 33.3	
(F) RCA 78 RCA 45		RCA Victor 78 RCA Victor 45	RCA Victor 33.3 Concert Hall 78
(G) RCA 33.3		RCA Victor 33.3	RCA Victor 78 RCA Victor 45
(H) FFRR		London FFRR Decca FFRR	

the stage is 30; if no equalizer were provided between stages a signal of 110 mv. to the first grid would drive the second stage to capacity. The effect of the inserted equalizer is to reduce high-frequency signals to the point where distortion in the second stage is also negligible. Lower frequencies are of course passed with less attenuation but since those below the turnover are attenuated on commercial recordings, no additional distortion results. The net result is that almost complete freedom from distortion is attained without the employment of feedback.

The chassis, Fig. 4, is designed to be mounted on the phonograph motor board, Fig. 1. The equalizers are mounted underneath the chassis on a terminal board which facilitates removal or replacement. If desired, they can be potted in the manner previously described[1] and this has the advantage of stabilizing them against the effects of moisture.

The equalizers are substantially the same as those designed for the earlier unit with the exception of the input resistors, which are reduced to the smallest size consistent with good response. The specified input resistance establishes the gain of the entire unit at approximately 36. If the preamplifier is to be used with a high-output (50-100 mv.) magnetic cartridge or a crystal pickup it will be advantageous to make the input resistors 1.5 megohms because this size results in slightly better bass response. It is not possible to reduce the input resistors to less than 820,000 ohms without seriously affecting bass response; the gain of 36 can, therefore, be considered the maximum attainable from a phonograph preamplifier utilizing a single 12AY7 tube.

Table 1 shows equalizers for a variety of purposes and gives examples of well-known discs for which each is designed. Although it is entirely possible to incorporate the complete set into the preamplifier, the writer presently feels that satisfactory compensation can be made for the majority of pressings with a smaller number of equalizers. The last column has been included in the table to aid the constructor in making a sensible selection. It should be mentioned that *RCA Victor* does not publish its recording characteristics, and equalizers for its discs are based on curves determined from listening tests by a number of observers. If any uncommon equalizers are desired they can be calculated easily and rapidly by means of a recently-published design chart.[3]

Some writers have advocated the use of two-section, instead of single-section, equalizers for bass compensation, holding that in this manner a sharper turnover is obtained.[4] Calculation seems to show, however, that this is not the case and furthermore that the two-section equalizer suffers from some special disadvantages. Fig. 3 illustrates the characteristics of each type for a 500 c.p.s. turnover. If the high-frequency attenuation for the single section is fixed at that which automatically results for a two-section equalizer, the latter provides a more desirable response than the former; the low-frequency response is down 3 db. from the ideal at 90 c.p.s. for the single and at 50 c.p.s. for the dual. The performance of the single section can be improved, however, by accepting greater high-frequency attenuation; this is not possible with the two-section unit. For the equalizer shown in Table 1B the response is down 3 db. at 25 c.p.s., as indicated by Fig. 3.

The output impedance of the last 12AY7 section is about 20,000 ohms. If the signal is fed from this stage into a low-mu triode with an input capacitance of approximately 50 $\mu\mu$fd., an additional 110 $\mu\mu$fd will bring the treble response down 3 db. at 50 kc., which is not considered objectionable. This capacitance is equivalent to about four feet of single-conductor shielded microphone cable. If a very much longer wire than this is required, special low-capacity cable may be needed or resort may be had to a cathode-follower output stage at the preamplifier.

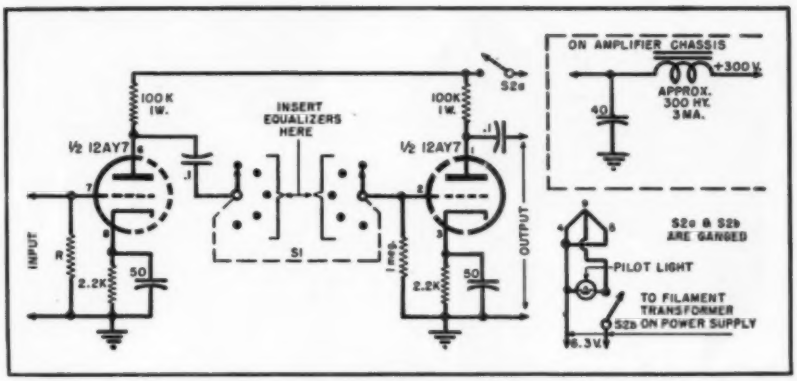


Fig. 2. Circuit diagram of preamplifier. Equalizers connect to switch S_1.

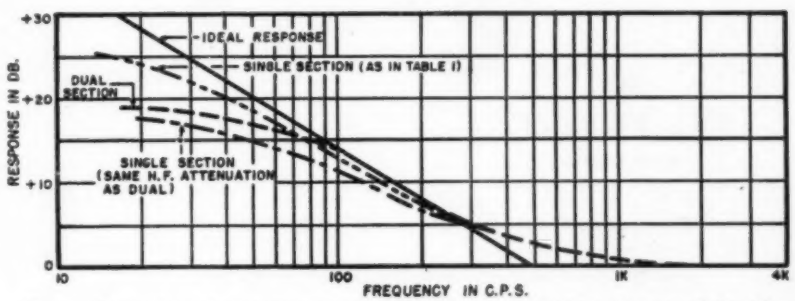


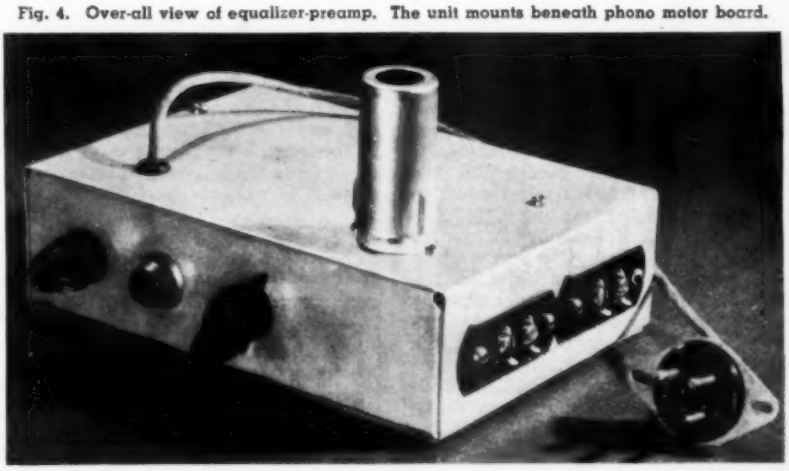
Fig. 3. Comparison of response curves for flat, 500 c.p.s. equalizer shown in Table 1B.

REFERENCES

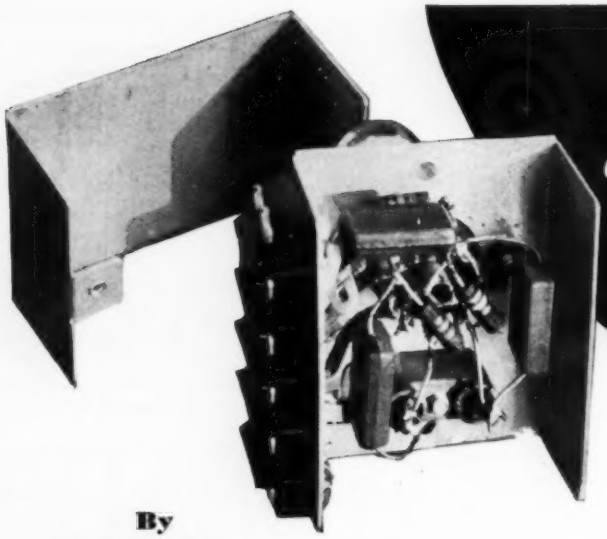
1. *Boegli, Charles; "A Preamp for Magnetic and Crystal Pickups,"* RADIO & TELEVISION NEWS, *July, 1950.*
2. *Knight, C. R. and Haase, A. P.; "A Low-Noise Input Tube,"* RADIO-ELECTRONIC ENGINEERING, *March, 1949.*
3. *Boegli, Charles; "Equalizer Design Chart," Electronics, April, 1950.*
4. *McProud, C. G.; "Recording Characteristics," Part 2, Audio Engineering, January, 1950.*

—30—

Fig. 4. Over-all view of equalizer-preamp. The unit mounts beneath phono motor board.



THE "BAND-EDGER"



By
RON PICKETT,
KH6AAD/6

Construction details on a compact, easy-to-build frequency measuring test unit. A "must" for every ham.

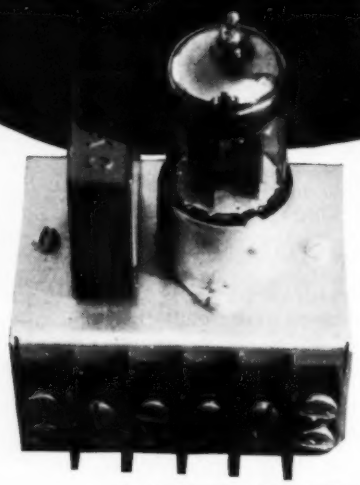


Fig. 1. Over-all view of "Band-Edger." Chassis was formed from a .020" aluminum sheet.

FREQUENCY measurement in the ham shack has become a vital necessity. Not only are we required by regulation to have adequate frequency measuring equipment on hand, but good operating practice demands some form of frequency measurement.

A large percentage of hams have come to rely on the calibration of their receivers to accomplish this, and in some cases a sufficient degree of accuracy can be achieved in this manner. From some of the remarks one hears on the amateur bands, however, altogether too many of us are content to rely on the other fellow's frequency checks, and this method is unsatisfactory at best.

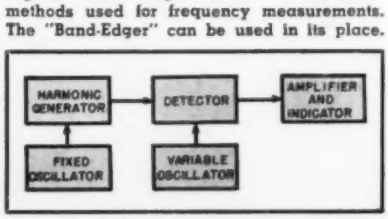
One of the basic methods of frequency measurement, and one which has been successfully used for many years by many radio services, is shown in the block diagram of Fig. 2. A standard oscillator, which is capable of being adjusted to a precisely known frequency, is fed into a harmonic generator which sets up multiples of the oscillator frequency throughout the range in which measurements are to be made. Another oscillator, of calibrated variable frequency, is used to interpolate between the marker signals produced from the fixed oscillator. This may be done either directly or at harmonics of the variable oscillator. The marker signals and the variable frequency oscillator output are fed into a detector, together with the signal whose frequency is to be measured. The output from the detector is amplified and fed into some sort of indicating device, such as a pair of headphones.

In using this sort of frequency measuring equipment, it is only necessary to establish a beat note between the unknown and the interpolation oscillator, and read the frequency from the calibration of the interpolation oscillator as a difference frequency from the nearest marker signal. The marker signals establish the major points, and the interpolation oscillator provides the fine divisions, much in the same manner as the hour and minute hands of a clock.

Such frequency measuring equipment is sometimes quite complicated, particularly when the accuracy requirements are high and when it is desired to have the equipment completely self contained. If, however, the accuracy required is not too great, and if we can combine portions of the equipment with other apparatus already in service, we can simplify our frequency measuring equipment considerably.

The station receiver should be able to serve as the interpolation oscillator, since it is variable over the required range and is usually calibrated to within a few kilocycles. In fact it also contains a detector and amplifier, as well as provision for some form of an indicator.

Fig. 2. Block diagram of one of the basic methods used for frequency measurements. The "Band-Edger" can be used in its place.



So, aside from the power supply (for which, in most cases, the receiver can be called upon) adequate frequency measurement can be made simply by adding a precision fixed oscillator and harmonic generator.

At this point we begin to see the light. All we need to do is add, say, a 100 kc. crystal oscillator which is rich in harmonic output to mark the band edges, and use the calibration of the receiver itself for closer measurement.

But there's a catch to it. Using a 100 kc. crystal marks the amateur bands adequately, but what do we do about the edges of the phone sub-bands which fall on multiples of 50 kc.? It is true that we can use interpolation with the receiver, but accuracy will suffer because at the odd multiples of 50 kc. the receiver is tuned furthest from a marker signal, and may be calibrated so poorly as to make out-of band operation easy.

It would be much better to use 50 kc. or better still 25 kc. for the fixed oscillator frequency. Then the calibration accuracy of the receiver or interpolation oscillator need not be as great, since the band edges, including the phone sub-bands, are marked with the same accuracy as the crystal oscillator. Inaccuracies introduced in interpolation are then of much less consequence, since they will not result in out-of-band operation.

It is not necessary for the oscillator to operate on a fundamental frequency of 50 or 25 kc., since it is relatively easy to divide a 100 kc. or even a 200 kc. oscillator frequency into the desired lower frequency with a multivibrator. At the same time the multivibrator will function as the harmonic generator since it is a prolific source of harmonic energy.

In reviewing the current crop of catalogues and surplus advertising, it is apparent that while 100 kc. crystals appear to be readily available they are quite expensive. The 200 kc. crystals are advertised at 69 cents each, however, and look like a good bargain. To reach 25 or 50 kc. from an oscillator frequency of 200 kc. appears to require at least two tubes—one for the crystal oscillator, and one dual triode for the multivibrator. Miniature tubes will materially reduce the space requirements, but let's see what can be done to make this thing really simple.

As a starter, we can eliminate the usual tuned circuit in a conventional crystal oscillator by means of either circuit shown in Fig. 3. In both cases, the usual *LC* circuit is simply replaced by the crystal which is capable of behaving in much the same manner. Fig. 3B is the familiar Pierce crystal oscillator which resembles the "Ultraudion" self-excited oscillator, and Fig. 3A is simply a push-pull Hartley oscillator with the coil and condenser replaced by the crystal.

On closer examination, though, Fig. 3A also resembles a multivibrator to which the crystal has been added from plate-to-plate. And right here is the clue which will enable us to combine the crystal oscillator, the multivibrator frequency divider, and the harmonic generator all in one dual triode tube.

A little experimenting with various values of *R* and *C* in the circuit of Fig. 3A leads us to the conclusion that this is not the complete answer to our present problem. It is easy to make the multivibrator lock in at the crystal frequency, but it seems determined not to do so at an even harmonic of the multivibrator. At this point we recall that in balanced push-pull circuits the even harmonics are greatly reduced in the output circuit, so it appears that the crystal is behaving as a pretty well balanced tuned circuit. If we had wanted to divide the crystal frequency by an odd number, say 5 or 7, the circuit of Fig. 3A would perform very well. But starting with a 200 kc. crystal, to arrive at 50 or 25 kc. output, it is necessary to divide by 4 or 8.

However, we have now established the point that our original plan is sound, that is, it is quite practical to combine the crystal oscillator and multivibrator in one tube. So let's try another combination, such as that shown in Fig. 4. In this case, it appears that we have a Pierce oscillator circuit to which has been added another triode section connected to the oscillator in the same way a multivibrator is connected.

Again, a little experimenting with various *R* and *C* combinations shows that the circuit performs as expected and, in addition, the even harmonics of the multivibrator appear to synchronize with the crystal frequency as readily as the odd harmonics. In *Terman's* "Radio Engineers' Handbook" we find that the natural frequency of the multivibrator is approximately:

$1/(R_1C_2 + R_2C_1)$ cycles-per-second.

Also we find that by making the *RC* constants for each triode different, it is possible to emphasize synchronization for one particular harmonic. A little more experimenting brings us to the parts values shown with Fig. 5, which is the circuit of the "Band-Edger" as it was finally evolved, for 50 kc. output.

During all of these experiments, an oscillograph and a calibrated oscillator covering the range of 20 to 200 kc. are invaluable. It is possible to use other means, but the process is quite involved and can get tedious.

Construction of the "Band-Edger" is as simple as its circuit indicates. The chassis can be laid out as shown in the photographs, and is readily formed from .020 inch aluminum sheet with an ordinary bench vise. The size and positions of some of the holes will be dictated by the parts used, of course, but those incorporated in this model seem to be readily available and inexpensive. The terminal strip shown need not be used. Instead, the connecting leads can be brought through a grommet.

The plate supply lead to the multivibrator triode was brought out to a separate terminal in this model so that the crystal oscillator alone could be used to provide check points at 200 kc. intervals. When the 50 kc. intervals are required, it is only necessary to switch on the plate supply to both sections.

The "Band-Edger" requires 6.3 volts at .3 ampere on the filament and 200 to 300 volts at about 8 milliamperes plate supply. Most receivers can readily supply these voltages, and usually an unused corner can be found where the unit can be mounted inside the receiver.

Harmonic output from the "Band-Edger" is sufficient for use through the 10 meter band, with only a short piece of wire connected to the output terminal and placed near the first detector tube in the receiver. If greater signal strength is required, it is possible to couple the "Band-Edger" more closely to the receiver input by using a 3 to 30 $\mu\mu$fd. trimmer condenser connected between the "Band-Edger" output and the receiver input terminals.

In checking out the "Band-Edger" to be sure it is operating properly, couple some signal from the "Band-Edger" to the input of the receiver. Usually all that is necessary is to use a few inches of wire as antennas on both units. With the crystal oscillator only in operation, a signal should be heard every 200 kc. across the receiver dial. Switch on the multivibrator triode and if it is operating properly, additional signals will be found at 50 kc. intervals. It is possible that the multivibrator will tend to synchronize at some other frequency, probably either 40 kc. (division by 5) or 66⅔ kc. (division by 3). If this occurs, it will be necessary to change the value of one of the grid resistors until the proper division rate is obtained consistently.

—30—

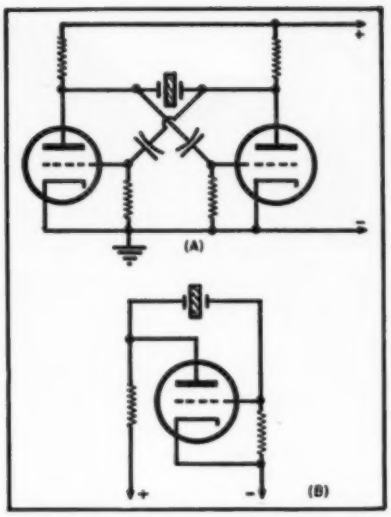


Fig. 3. The first transition from the basic design (Fig. 2) to author's final form was to omit the usual LC circuits. Diagrams of A and B show the designs after transition.

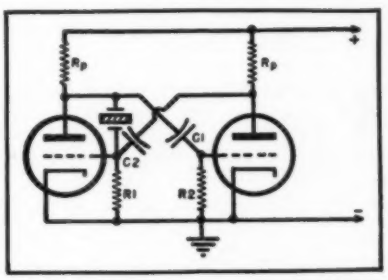
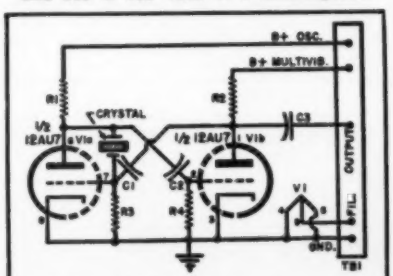


Fig. 4. Circuit diagram of a combination crystal oscillator and multivibrator.

Fig. 5. Diagram of "Band-Edger." Power requirements are 6.3 volts at .3 ampere and 200 to 300 volts at 8 milliamperes.



R_1, R_2—18,000 ohm, ½ w. res.
R_3—51,000 ohm, ½ w. res.
R_4—160,000 ohm, ½ w. res.
C_1—68 $\mu\mu$fd. mica cond.
C_2, C_3—180 $\mu\mu$fd. mica cond.
TB_1—Terminal block (Jones #4-140 or #4-140Y)
Crystal—200 kc. crystal
V_1—12AU7 tube

By
JOHN R. MEAGHER
Tube Department, Harrison, N. J.
Radio Corporation of America

Part 2. Concluding article covering additional causes of and remedies for horizontal pulling.

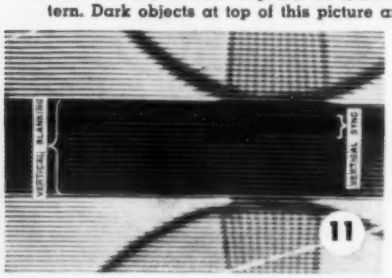
FORTUNATELY for the television technician, any appreciable loss of low-frequency response in the r.f., i.f., and video amplifiers and any appreciable undesired limiting action in the video amplifier can be detected very quickly by visually checking the *relative* intensity (blackness) of the vertical sync, vertical blanking, and picture signals, as they appear on the picture tube. To observe these signals, it is necessary to adjust the vertical hold control so that the picture rolls slowly downward out of vertical sync. It is necessary also to adjust contrast and brightness to make the vertical blanking and sync signals visible, as shown in Fig. 11, which represents approximately the correct *relative* darkness of these signals. For inspection purposes, it is preferable to increase the brightness slightly or decrease the contrast slightly in order to make the vertical sync appear as a dark grey, instead of the dead black shown in Fig. 11. We suggest that the reader carefully study the photographs and captions in Figs. 11, 12, 13 and 14.

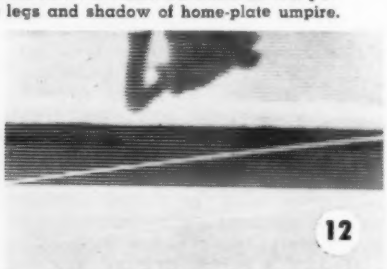
In all cases of horizontal picture pulling, it is a worth-while practice to check the relative intensity of sync, as shown in Fig. 11. If the inspection reveals that the low-frequency response is poor, check the alignment of the r.f. and picture i.f. amplifier, using a good sweep generator and a crystal-calibrated marker oscillator. If the alignment is satisfactory, check the tubes, components, and voltages in the video amplifier. If the inspection reveals limiting action, check the video amplifier and the a.g.c. output voltages.

If the relative intensity of the sync, blanking, and picture signals appears normal, it may be assumed that the picture pulling is not caused by trouble in the r.f., i.f., or video amplifiers. Attention should then be concentrated on the sync separator and the horizontal a.f.c. circuit.

Fig. 11. Portion of vertical blanking and sync signals for single field. In making this picture and those of Figs. 12, 13, and 14, the contrast was reduced and brightness increased in order to "unblank" the blanking lines. Camera shutter was opened for only 1/60th second, which is time required for electron beam in picture tube to trace a single field of approximately 262 lines, consequently every other horizontal scanning line is absent in this photo, which otherwise represents normal signal conditions. As clearly shown, the blanking is slightly darker or stronger than darkest picture signals. Sync is considerably darker or stronger than blanking. If receiver has poor low frequency response, or if there is undesired limiting action, amplitude of sync signals is reduced with respect to higher frequency picture signals and, as a result, receiver becomes more susceptible to horizontal pulling. Examples of reduced sync amplitude are shown in Figs. 12, 13, and 14.

Fig. 12. In this case, sync signals are only slightly darker or stronger than blanking and dark-picture signals. This trouble is caused by excessive signal input and consequent limiting action in the video amplifier due to incorrect setting of a.g.c. threshold adjustment. Fig. 8 (Part 1) shows the result of same condition on test pattern. Dark objects at top of this picture are legs and shadow of home-plate umpire.





Localizing the Cause

The writer suggests a simple check that is occasionally helpful in isolating the cause for picture pulling. Briefly, this check consists of removing horizontal sync input from the horizontal a.f.c. circuit, free-wheeling the horizontal oscillator to obtain a momentarily stationary picture, and noting whether the pulling is still present on the picture. The check is helpful in showing whether the trouble is in the a.f.c. circuit or ahead of it. The procedure is as follows.

Make a mental note of the position and amount of horizontal pulling. Temporarily disconnect the condenser that connects horizontal sync pulses (from the sync separator) into the horizontal a.f.c. circuit. Disconnecting the condenser will throw the horizontal oscillator completely out of sync. With the horizontal hold control set at its mid-position, turn the main frequency adjustment of the horizontal oscillator to bring the oscillator to the correct frequency, as indicated by the momentary appearance of a complete picture. Then carefully adjust the horizontal hold control in an attempt to keep the picture from rolling horizontally for at least a second, or just long enough to inspect the picture and to determine whether the picture pulling has disap-

peared. If (with horizontal sync removed) the picture pulling is still present, the cause of the pulling is probably in the horizontal a.f.c. circuit. But if (with horizontal sync removed) the pulling is not present on the picture it indicates that the trouble is ahead of the horizontal a.f.c. circuit.

Occasionally extraneous signals from an adjacent video amplifier, audio amplifier, or other source may be coupled into the horizontal a.f.c. circuit. This possibility should be considered in cases where the previous check indicates that the cause for picture pulling is in the horizontal a.f.c. circuit.

In Part 1 of this article, mention was made of the possibility that voltage surges in the vertical oscillator circuit might be coupled back into the horizontal a.f.c. circuit and result in horizontal pulling at the top of the picture. One method of checking for the presence of such trouble is to open the condenser that couples the vertical sync pulses (from the sync separator) into the vertical integrating network and free-wheel the vertical oscillator, by careful adjustment of the vertical hold control, to keep the picture from rolling vertically. If the horizontal pulling disappears when the condenser is opened, it may indicate that additional isolation is required between the vertical oscillator and the horizontal sync input circuit.

A general method of determining whether the vertical oscillator and deflection circuits are in any way responsible for horizontal pulling is to remove the vertical oscillator and output tubes and drive the vertical deflection coil from the vertical output of another receiver which is tuned to the same station.

In many receivers, the amplitude of sync input to the sync separator is rather critical; either too much or too little sync input may cause picture pulling. In cases where all components have been checked and appear to be normal and the cause for pulling cannot be localized by the methods suggested, it may be advisable to try changing the level of the sync input to the sync separator. If the sync signal for the sync separator is taken from across a resistor in the video amplifier, it may be feasible to alter the value of the resistor or temporarily substitute a carbon potentiometer to determine the optimum value.

The tubes, voltages, and load resistors in the sync separator are usually critical with respect to picture pulling. Occasionally, it may be helpful experimentally to alter the value of a plate-load resistor in the sync separator. The writer offers these comments reluctantly, because he is definitely not in favor of the practice of altering the value of one component to compensate for a defect in another component that has escaped detection.

When picture pulling is common in all receivers of a particular model, the logical procedure is to find out whether the manufacturer has issued information on modifications to correct or improve the condition.

Many technicians have learned through actual experience that the best and fastest way to locate sync troubles is by the use of a scope with adequate frequency response which is designed for use with an isolating probe.

External Interference

When external interference is present, it frequently causes horizontal pulling or weaving. Usually, in such cases, the interference is clearly evident in the picture and is obviously responsible for the pulling. Occasionally the cause and effect may be confused.

Diathermy interference produced the pulling effects shown in Figs. 15 and 16. These particular examples were photographed because they lack the pronounced herringbone pattern that normally characterizes diathermy interference and for that reason might be mistaken for internal trouble in the receiver.

Any interference that produces beat-frequency bars of sufficient intensity in the picture can result in unstable horizontal sync with accompanying horizontal pulling or weaving, particularly in cases where the beat is a low frequency signal that can readily pass through the narrow-band sync separator.

Obviously, the correct remedy for picture pulling in cases of interference is to eliminate the interference.

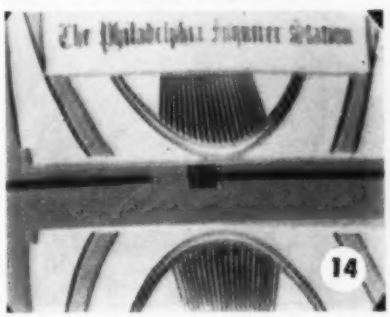
In all puzzling cases of horizontal pulling, it is a good practice to observe that cardinal rule of television service —"Check for presence of the same effect on other receivers in the area." This excellent rule requires modification in some cases of horizontal pulling, because it is advisable to check sets of the *same model*, or at least sets that have the same type of horizontal

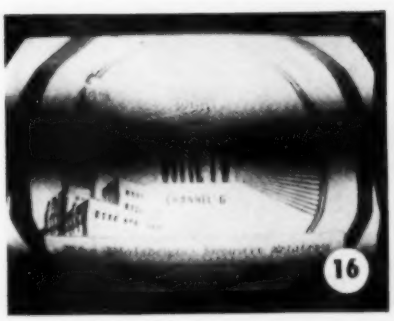
Fig. 13. Here the sync signals are completely wiped out or reduced to blanking level by undesired limiting action in video amplifier. Trouble is caused by low plate voltage on 2nd video tube. The same condition can result from excessive signal input to video amplifier, as shown in Fig. 12, or incorrect bias and other troubles in the video amplifier. There is horizontal pulling at top and bottom of picture and sync is extremely unstable. With complete absence of sync the horizontal and vertical oscillators may tend to sync on the leading edge of the blanking signals.

Fig. 14. Instance where sync amplitude is reduced to approximately same level as the darkest picture signals. Trouble is caused by poor r.f.-i.f. alignment, the picture carrier is too low on the slope of the response curve. Also refer to Fig. 7 (Part 1).

Fig. 15. Horizontal pulling resulting from diathermy interference. Beat in this case is a low frequency and therefore does not exhibit herringbone pattern (due to frequency modulation) usually characteristic of diathermy interference. Interference might be mistaken for another type of trouble. See Fig. 16 for high-frequency diathermy beat.

Fig. 16. Horizontal pulling resulting from diathermy interference. In this case beat is a high frequency (about 4 mc.) which makes the fine-line herringbone pattern almost invisible in some receivers. This variety of interference might be mistaken for 120 cycle hum trouble. With diathermy interference, light and dark areas may remain stationary or may move up or down depending on whether or not the power supply for TV camera and diathermy equipment are synced. Unlike heater-cathode leakage, reversal of 117 volt plug on receiver does not shift position of interference.





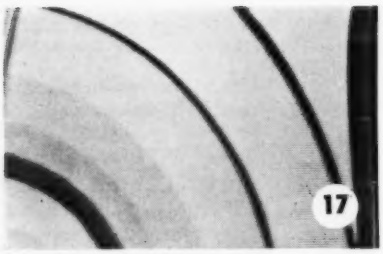


Fig. 17. Slight horizontal pulling at top of picture evidenced by bending of vertical wedge, caused by inoperative d.c. restorer (in a receiver where sync input for sync separator is taken from d.c. restorer circuit). When photo was taken, contrast and brightness controls were adjusted to show horizontal blanking signals at right side of picture. With normal contrast adjustment, bending is decidedly more pronounced. See text for other details.

a.f.c. circuit. Certain rare troubles, such as phase variation in the transmitted horizontal sync signals, may produce noticeable picture pulling in some types of horizontal a.f.c. circuits, but may have only slight effect in other types of a.f.c. circuits.

Microphonic Pulling

Picture pulling may show up momentarily whenever the horizontal a.f.c. tube is mechanically shocked or jarred, as by deliberately tapping the tube or through transmitted vibrations from persons walking or dancing near the set. Any relative motion of the elements in the a.f.c. tube results in a variation in the gain, or control action, which produces a variation in horizontal sync phasing. The socket of the a.f.c. tube is usually shock-mounted to minimize such microphonic action. In cases where microphonic horizontal pulling is evident and objectionable, it is advisable to try a new tube in the a.f.c. socket.

Troubleshooting Procedure

It may be helpful to summarize some of the facts that we have discussed. We can accomplish two objects by presenting the summary in the form of a troubleshooting procedure.

1. Determine whether the condition is raster pulling or picture pulling. Raster pulling affects the shape of the raster. Picture pulling does not affect the shape of the raster.

2. If it is a case of raster pulling, make checks (depending on the particular symptoms) for trouble in:

(a) The "B" supply filter circuit

(b) The horizontal deflection circuits

(c) The deflection yoke

(d) Undesired magnetic field near the picture tube.

3. If it is a case of picture pulling, remember that the horizontal sync signals must pass through the r.f., i.f., and video amplifiers and through the sync separator in order to reach their final destination in the horizontal a.f.c. circuit. Ordinarily, any trouble that causes picture pulling must be in the r.f., i.f., video, sync separator, horizontal a.f.c., or power supply sections of the receiver. With this fact in mind, apply the following checks:

(a) Check the amplitude of sync (in relation to the amplitude of blanking and picture signals), as seen on the picture tube, to determine whether poor low-frequency response or undesired limiting action has reduced the relative sync amplitude. The sync must be definitely stronger, or darker, than the blanking and the darkest picture signals, as shown in Fig. 11.

(b) If the relative amplitude of sync appears normal on the picture tube, it means that the trouble is unlikely to be in the r.f., i.f., or video amplifiers. (One of a few exceptions to this statement is illustrated in Fig. 17, where an inoperative d.c. restorer in the video amplifier has caused slight picture pulling without affecting the relative sync amplitude as seen on the picture tube.) If the sync amplitude appears normal, it leaves the sync separator and the horizontal a.f.c. circuit under suspicion.

(c) Check to determine whether the trouble is in the horizontal a.f.c. circuit, or ahead of it, by temporarily removing sync input from the horizontal a.f.c. circuit, free-wheeling the horizontal oscillator, and inspecting the picture to determine whether the pulling is still present. If the pulling is still present, the trouble is probably in the a.f.c. circuit. If the pulling disappears when sync input is removed, the trouble is probably ahead of the a.f.c. circuit; possibly in the sync separator.

The writer wishes to thank the management of WFIL-TV for permission to reproduce the station's test pattern.

—30—

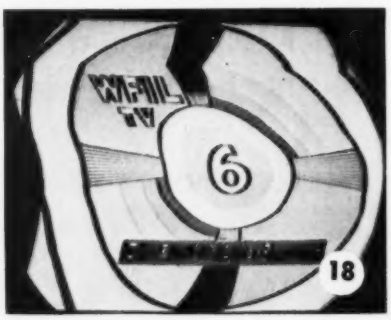
The photographs of Figs. 18, 19, 20, and 21 are not referred to in the text. Their inclusion is for the purpose of amplifying the text and providing additional data.

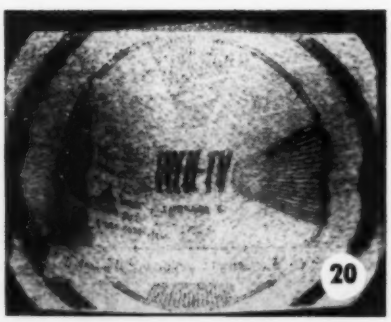
Fig. 18. Horizontal pulling caused by poor low frequency response (or excessive high frequency response) in picture i.f. amplifier. Black smearing of vertical wedges is one indication of regeneration in amplifier which requires realignment. Regeneration in this case results from tuning grid and plate circuit of one stage in amplifier to same frequency instead of staggering tuning as required in stagger-tuned amplifier.

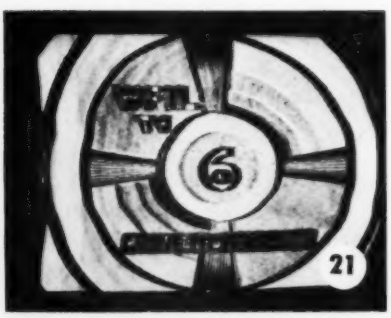
Fig. 19. Horizontal pulling, or in this case, horizontal damped ripple, caused by the electrical hunting action in horizontal frequency control circuit. Condition shown is produced by an open .05 μfd. condenser connected from the grid circuit to the chassis in RCA "syncrolock" horizontal frequency circuit. Amplitude and the duration of the ripple change with the adjustment of the horizontal hold control.

Fig. 20. Horizontal pulling may be expected on extremely weak signals. Realignment is almost always helpful in weak-signal areas. The r.f. and picture i.f. amplifiers should be aligned so that picture carrier falls at 70% or higher on slope of overall response curve when receiver tuning control is adjusted for best sound. It is also advisable to use best available antenna and booster with good signal-to-noise ratio.

Fig. 21. Horizontal pulling and unstable horizontal sync may result from certain conditions of reflections or ghosts. Ghost signal in this example is almost merged with direct signal, resulting in poor picture quality and horizontal pulling. Occasionally, when intensity of a close-in ghost is approximately the same as direct signal, the two may alternate in taking control of horizontal oscillator. In such cases, picture shifts erratically a distance equal to spacing between the ghost and direct signal.







Practical SOUND ENGINEERING

By
H. M. TREMAINE, D.Sc.
College of Audio Engineering
University of Hollywood

Part 2. A discussion of architectural acoustics as they affect broadcast and recording studios.

Fig. 1. The recording end of the scoring stage used by Republic Productions of Hollywood for recording movie sound tracks.

THE behavior of sound waves has given rise to a whole new field of endeavor—Acoustical Engineering.

The architectural acoustics of broadcasting and recording studios and theaters are of extreme importance, since they are the vital links in the chain connecting the original source of sound with the listener.

Vast sums of money have been spent in research for the development of motion picture broadcasting studios to achieve the ultimate in acoustical design. The primary factor to be overcome is frequency distortion, which is caused by the design and the effect of the materials used in the studio construction.

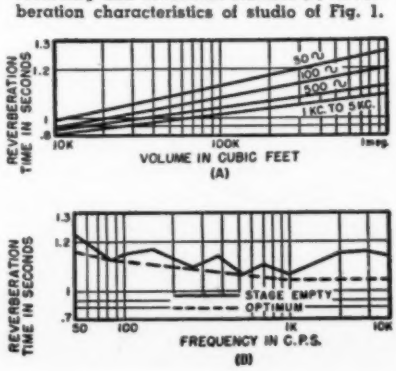
Any distortion which originates within the studio, due to acoustical design, will be transmitted along with the original program material. A modern electrical recording and reproducing system contributes only a small percentage of distortion; however, acoustic defects in the studio, such as excessive dead spots, structural vibration, external noises, reflection, etc., give rise to frequency discrimination and distortion which cause unintelligible and unnatural sounds to be transmitted. Seldom does the listener hear program material which has not been altered in some manner, either intentionally or unintentionally, during its transmission to him.

Sound absorbing materials react differently at the high and low frequencies. Generally, there is much less absorption at the low frequencies than at the high frequencies. Physical dimensions of the surfaces in the studio may be such that they reflect the high frequencies, but not the low, which are bent around the edges of obstacles in the studio resulting in sound eddies which set up interference patterns.

Improperly designed studios may be extremely "live" to some frequencies and "dead" to others. In addition to these characteristics, the room may be resonant to certain bands of frequencies, due to its physical dimensions.

Frequency distortion may also be added by the media, including air, through which the sounds are transmitted; however, this is negligible for all but intense sounds. Distortion is present in the air at all times since air follows the action of gas under pressure.

Fig. 2. (A) Optimum reverberation time for recording and broadcast studios. (B) Reverberation characteristics of studio of Fig. 1.



Sounds originated in open spaces are heard as direct sounds. When the listener moves away from the source, the intensity drops off as the square of the distance. In a room this is not true; the sound may decrease irregularly, and depending on room conditions, may increase because of interference patterns. Interference is the result of multiple reflections from the enclosure walls. Sound remains in an enclosure until it is completely dissipated, the intensity being reduced by each reflection. The reverberation time of a room is measured by emitting a sound, then measuring the time required for the sound to die away to one-millionth of its original intensity or a reduction of 60 db.

The reverberation time of a studio should vary at a rate which will produce maximum intelligibility, give "presence" to the program material, and still preserve its original characteristics. This means the studio must have enough reflective surfaces to lend brilliance to the program material yet have adequate absorption to prevent excessive reverberation.

Sound when confined to an enclosure becomes quite complex in its action, when compared to that in free air. In free air only the direct sound from the source is heard, while in an enclosure,

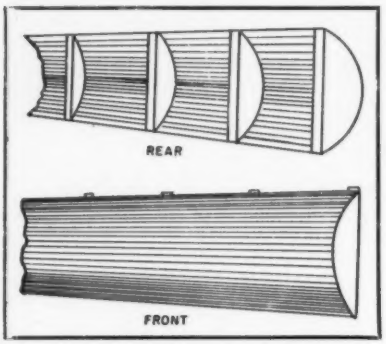


Fig. 3. Rear and front views of the polycylindrical diffusers discussed in the text.

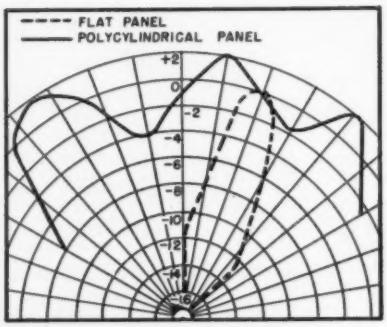


Fig. 4. Polar response curve of a polycylindrical diffuser used in the studio.

it consists of both the direct and reflected sound.

Stages designed for broadcasting and the recording of speech and music differ in construction mainly in their size and interior treatment. Frequently diffusers are placed at intervals along the walls and ceilings to break up "standing waves," with additional insulation around the base to deaden the effect of footfalls and the movement of equipment. The ventilation system is baffled, and the interior of the air ducts treated acoustically to prevent outside noises from entering the room.

When a sound wave leaves its source in a room, it expands spherically until it meets the enclosure walls. It then suffers partial reflection, absorption, and transmission. The reflected wave continues to travel and is again reflected, and the process is repeated until the wave energy is completely dissipated. In rooms constructed of hard plaster or similar materials, several hundred reflections take place before the energy is completely spent.

Table 1. Optimum number of musicians for various sized studios based on type of program material being recorded or broadcast.

VOLUME (cu. ft.)	BROADCAST STUDIOS	AUDITORIUMS	MOTION PICTURE SCORING STAGES
10,000	12	—	—
20,000	25	6	10
50,000	50	9	22
100,000	130	19	36
200,000	250	31	70
500,000	—	62	140
1,000,000	—	105	240

Echo chambers are built using this principle.

The speed of sound is considered to be 1120 feet-per-second. This tells us that for a large room the reverberation time may run into several seconds. Excessive reverberation time causes overlapping of successive sounds, making the program indistinct and sometimes unintelligible.

The reverberation time of a room depends on both the intensity level of the emitted sound and the absorption coefficients of the acoustic materials in the room. The optimum reverberation time for broadcasting and recording studios is shown in Fig. 1A. Experience over many years has determined that there is also an optimum number of musicians for each size room, depending upon the type of program material. This data is given in Table 1.

It will be noted from Table 1 that fewer musicians are used for auditorium work than for either broadcasting or motion picture recording. For broadcasting the tendency is to use more musicians in a given space.

Of primary importance to the sound engineer are the over-all results produced in the studio by reflections, refraction, diffraction, absorption, and "standing waves."

When sound is generated in a room in which the walls are parallel, standing wave systems are set up at certain frequencies, which are dependent on the physical dimensions of the room. The lowest frequency that will produce a standing wave is one whose wavelength is equal to twice the distance between the enclosure walls. Parallel walls will also cause resonant effects at harmonic frequencies. Thus, for a room with a ceiling height of 11¼ feet, resonance may occur at frequencies of 50, 100, and 150 cycles-per-second, and others which are multiples of the fundamental frequency. The wavelength may be determined from the equation $\lambda = V/f$.

Resonance in a room introduces frequency distortion, resulting in peaks and valleys in the over-all response characteristic. It also creates a hangover effect near the resonant frequencies.

Standing waves are produced in a room by prolonged tones, and are the result of two waves traveling in opposite directions. A standing wave is characterized by its production of nodes or nodal points within the room.

The effect of standing waves may be minimized or controlled by increasing the absorption of the room or changing the spacing and shape of the reflecting surfaces.

If the absorption of the room is increased, it may be detrimental to the over-all results by making the studio too "dead," and if the acoustic treatment is selective to frequency the room may become quite "bassy."

To reduce the possibility of standing waves, studio dimensions should be chosen that are not integral to each other. For small rooms the ratio of height to width, to length, is 1 to 1.25 to 1.60. For average size studies, the ratio should be on the order of 1:1.6:2.5.

The reverberation time characteristic not only depends on the decay period of the room but also the diffused distribution of the sound around the room. Dispersion of the sound is obtained by the use of non-parallel walls, and convex or projecting surfaces, which will disperse the reflections in all directions. Dispersion of the sound does not lessen the energy in the room but tends to increase the number of reflections in a given time, thus reducing the intensity of the individual reflections. This results in a smoother decay period for all frequencies, making the placing of microphones less critical.

Figs. 1 and 6 show the interior of the scoring stage built by *Republic Productions, Inc.*, Hollywood, California for recording music for motion pictures. This stage has approximately 250,000 cubic feet of space and covers an area of 65 x 112 feet.

In Fig. 1 are seen several polycylindrical diffusers, or convex reflectors, spaced along the wall extending from the floor to the ceiling. Several more are shown across the rear wall and ceiling. At the front end of the stage, the floor is raised to three different levels to facilitate the proper placement of the orchestra. Motion picture projection equipment and screen are provided for cueing purposes. The mixing console is used for rerecording and special "dubbing" projects. Normally all rerecording is done on another stage.

At the right of the screen is a glassed-in room which is used for recording large choral groups or for other type pickups requiring separation from the orchestra. On the left side is an organ vault.

In Fig. 6 is shown a rear view of the stage and the monitor room where the sound mixer, with the aid of the musical director, monitors and mixes the final recording, which is then carried over lines to the recording department in another building.

Polycylindrical diffusers are constructed of one-quarter or three-eighths inch plywood, and bent into a segment of a circle, as shown in Fig. 3. Each diffuser has a different radius. The sound is dispersed by reflection from its curved surface and by radiation, due to its resonant action or panel vibration, which is set in motion either by the direct action of the original sound or by partial absorption and reradiation of the sound striking its surface. This is illustrated by the "polar curve" response, Fig. 4, which shows the dispersion characteristics of a flat panel compared to a convex panel.

The dispersion by reflection will depend on the size and curvature with respect to the wavelength of the sounds striking its surface. The resonance frequency depends on the damping factor of the material and the spacing of the internal bracing, etc. Flat panels, if placed too close to a microphone, may produce interferences due to the phase differences between

the source of sound and the reflections. Concave surfaces should be avoided as they act as sound concentrators, focusing the sound and causing echoes.

The walls and floor of the *Republic* scoring stage are of interest, and a cross section of their construction is shown in Fig. 5. The vertical walls are several inches thick, covered on the exterior with a heavy layer of stucco cement. Between the exterior wall and the inside wall is a layer of building paper and a 4 inch layer of rock wool, then a 6 inch air space, another 4 inches of rock wool, and an interior finish of wallboard and acoustic tile. A concrete floor is laid on a layer of loose dirt. Atop the concrete floor is an asphalt base in which railroad ties have been imbedded, to give strength to a hardwood floor which is laid atop the asphalt. This type construction reduces the possibility of low frequency rumble and earth noises being transmitted to the stage.

Although the walls are quite thick and will provide 40 to 50 db. of attenuation for noises originating outside the stage, this is still not sufficient attenuation to reduce the noise of low flying aircraft. To obtain any greater amount of attenuation is not practical from an economical standpoint.

The reverberation characteristics of this stage are shown in Fig. 2B. The solid line is the response obtained by measurement with the stage empty. The dotted line is the optimum response for a stage its size.

The reverberation time was measured using a loudspeaker, at the orchestra end of the stage, supplied with frequencies from an audio oscillator. The oscillator is a special motor driven device. As the frequencies are produced, they are "warbled" by the action of a four-sided cam mounted on the oscillator frequency dial. The tone is warbled approximately four times per second, ± 10 per-cent of the mean frequency. A calibrated microphone picks up the tones from the loudspeaker which are then recorded by a special high speed automatic level recorder on a wax-coated paper tape.

The purpose of the warbled tone is to prevent the formation of standing waves in the room, which might occur if steady tones were used. The warble tone is only required for frequencies below 1000 cycles.

So far, our discussion of sound stages has been confined to those used for the recording of music and broadcasting. But what about stages used for housing motion picture sets and the production of television shows, where the principal pickup is dialogue?

Stages of this type, insofar as general construction is concerned, are about the same as music stages, except that it is unnecessary to go to the expense of isolating the foundation and the floor. Also, no convex splays or similar devices are necessary.

Like the music stage, the walls should be quite thick to reduce interference from the outside. The doors to the exterior are generally constructed along the lines of an ice-box door, with interlocking edges similar to a bank vault door to prevent leakage around the jambs.

The interior walls of the stage are treated with rock wool, blown in between the risers and covered with muslin. Over the muslin is placed a single layer of common fly-screen to protect the muslin from damage. The thickness of the rock wool will vary from 2 to 6 inches depending on the isolation required.

As this type stage is used principally for dialogue pickup, the ambient noise level must be low and the ventilation system well insulated, otherwise a low-frequency rumble may be picked up during low-level passages in the dialogue.

When dialogue is recorded over a flat recording channel from a stage of the type just described, the reproduced sound may have an unnatural quality, and lack intelligibility. This results from the materials used in the set construction, and the reverberation characteristic of the stage. Even the actors' clothing has its effect.

All materials used in the construction of sound stages have a greater absorption at the high frequencies than at the low; thus, reflections increase the low-frequency response, causing the reproduction to become "tubby". This condition varies with set construction, the microphone placement, and distance from the source of sound.

Microphones should be suspended from a "boom" in front of and over the actor, and just out of the camera angle. Means should also be provided to "gun" the microphone towards the actor, as his movements are followed. This will tend to keep the sound quality uniform.

It is the practice in the motion picture industry to use a "dialogue-equalizer" in the dialogue microphone circuit to reduce the low-frequency response. The amount of equalization will depend on the type of microphone used, the set acoustic characteristics, and the type of recording system. Usually, these equalizers are designed to attenuate the low frequencies starting about 700 c.p.s. and tapering downward to around 12 db. at 100 c.p.s.

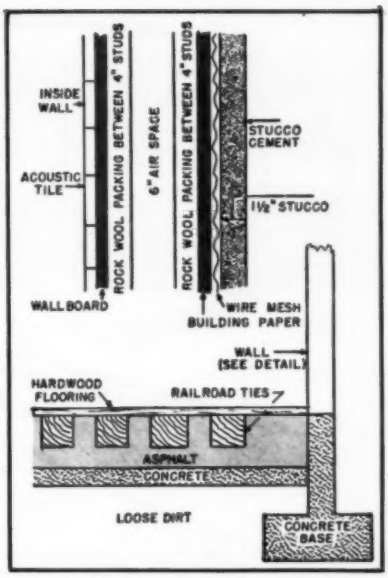


Fig. 5. Cross section of the construction used for the walls and floor of the Republic Production, Inc.'s scoring stage.

Low-frequency accentuation is also created by the fact that actors on sound stages speak more softly than normal. This increases the low-frequency components in their voices over their normal manner of speaking. To secure a normal reproduction of the actor's voice under these conditions, a dialogue equalizer is used.

It might be desirable under certain conditions to inject a small amount of high frequency equalization into the dialogue, particularly for film recording, to compensate for processing loss. Again this will be determined by the system, and microphones employed. Approximately 4 to 6 db. of equaliza-

(*Continued on page* 114)

Fig. 6. Opposite end of the studio shown in Fig. 1. The monitor room where the "sound mixer" and musical director monitor and mix the final recording is in center at rear.

SPLITTING PADS

By
H. C. CARMICHAEL
Consulting Engineer

Details on how various resistor combinations can be used to provide the proper matching networks.

IT IS sometimes necessary in communication and television work to apply two alternating currents such as speech, carrier, or music currents to one channel. This may be done by means of a transformer, but owing to the electromagnetic fields and frequency losses from the transformer, this method is not always desirable, and another method using combinations of non-inductive resistances is sometimes used. This method involves the formation of resistance networks, called pads, from non-inductive resistances. In the case of 600 ohm circuits it is usual to make matching pads from 1200 to 600 ohms and to connect the 1200 ohm outputs in parallel. There is a third method, shown in Fig. 1A, using a network of standard non-inductive resistors which involves a small power loss but is less expensive than the other methods.

An application of this method is shown in Fig. 1A, where it is used to connect two sources of alternating current to one channel or *vice versa*. For purposes of matching, it is necessary to make the values R_1, R_2, R_3, shown in Fig. 1A, such that when channels 1 and 2 are terminated in their correct impedances (600 ohms), then channel 3 will also be 600 ohms. Fig. 1A may be simplified to the arrangement shown in Fig. 1B. Now, when two resistances, R_1 and R_2, are connected in parallel, their joint resistance may be found by the aid of the formula:

$$R_T = \frac{R_1 \times R_2}{R_1 + R_2} \quad . \quad . \quad . \quad . \quad (1)$$

If this formula is applied to Fig. 1B, then the joint resistance of the two paths (600 ohms and x ohms) from A to C is:

$$\frac{600x}{600 + x}$$

Similarly, the joint resistance of the two resistances (600 ohms and x ohms) between B and C is:

$$\frac{600x}{600 + x}$$

These two joint resistance values are in series with respect to the line and thus their total resistance is:

$$\left(\frac{600x}{600 + x}\right) + \left(\frac{600x}{600 + x}\right) = \frac{1200x}{600 + x}$$

The other resistor from A to B (x ohms) is in parallel with this combination as shown in Fig. 1C which is a further simplication of Fig. 1A. Thus, if formula (1) is applied to this circuit, then the joint resistance of the combination will be:

$$\frac{\left(\frac{1200x}{600 + x}\right) x}{\left(\frac{1200x}{600 + x}\right) + x}$$

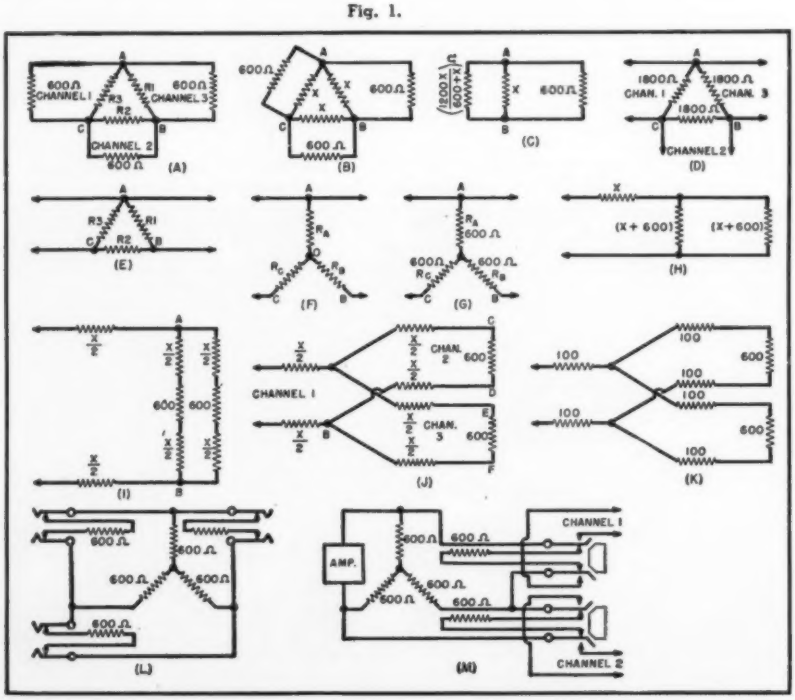
This, of course, must equal the resistance of channel 3 and thus:

$$\frac{\left(\frac{1200x}{600 + x}\right) x}{\left(\frac{1200x}{600 + x}\right) + x} = 600$$

This may be simplified to show that $x = 1800$ ohms.

Figure 1D shows the resistance network to satisfy the conditions shown in Fig. 1A.

Fig. 1.



Power Loss of Pad

The power loss from each channel to the mixer channel resulting from the use of this pad can be calculated as follows. Assuming a voltage of 10 volts across a source of 600 ohms in channel 3, then the voltage across points A and B in Fig. 1D would be 10 volts and the voltage across points A and C would be 5 volts, as the resistance of the combined resistor AC is equal to the combined resistor CB. The power loss equals:

$$20 \log \frac{E_1}{E_2}$$

and if the information supplied in the

(*Continued on page* 86)

Novel TV Antenna Installation Overcomes Mountain Terrain

By
ALBERT E. COMBS

The "Radarray" antenna was used with both of these installations. An open-wire line was run from top of hill to homes located in bottom of a canyon.

An open-wire line 490 ft. long paid dividends. It was the only answer to this installation problem.

EVERY television technician no matter where he operates encounters the challenge of fringe area reception. The three major problems are usually signal strength, interference, and reflection—causing ghosts.

Because the signal strength is liable to be variable, the first step is to locate the strongest signal. A portable TV set or a field strength meter with a half-wave dipole on the end of an eight foot mast should be used to probe the rooftop and surrounding territory. Strength of signal does not necessarily depend upon height; many times the best signal will be found eight feet or so off the ground. The important thing is to locate the strongest signal area and place the antenna there.

V-cone antennas, up to four stacks, are practical if there is no interference or ghost. Experience has shown that the V-cone is adequate for gathering signal, but its directional characteristics are not comparable with other systems. For directional characteristics to eliminate interference and ghosts, the best type of antenna is the "Radarray." It is a high gain, stacked dipole with multiple reflectors, and has a very narrow frontal lobe with almost a complete null to the rear, and is made by the Gon-Set Co. of Burbank, Calif. This antenna requires careful orientation.

Mountainous terrain presents other problems in addition to weak signal. The only possible signal may be on a hilltop far from the receiver location. For such long runs, twin-lead has too great a loss, and an open-wire line is the only alternative. There is available on the market packaged open wire line suitable for this purpose. To suspend this long line, ten foot thin-wall 1" or 1¼" electrical conduit tubing can be used, and the line fastened to the pole with mast insulators hooked over the line spreaders. Open-wire line should be kept taut by springing the steel poles, and should be kept as far as practical from fences, power lines, and trees.

Proper impedance matching must be maintained between the antenna and the line, and between the line and the set. With long transmission lines, any mismatch will affect reception a great deal more than the short lines ordinarily used. Time may be saved by figuring out the line terminations before going to the job. For example, if the job has been surveyed and it is known that a line five hundred feet long will be required, open-wire line is the obvious choice. This line is commercially available in 450 ohm impedance and will have to be terminated by a matching transformer on at least one end. If the "Radarray" antenna is to be used it will match the line; if not, a matching section of line must be used. In any case, a matching section will be required at the set. A bad standing wave ratio, caused by mismatch, will ruin an otherwise good installation. To match a 450 ohm line to a 300 ohm antenna, connect a 3.5 ft. piece of 300 ohm twin-lead between the antenna and line, and solder the remaining end to the open-wire line. This matching section will give a better energy transfer. In general, mismatch between the antenna and the line is not as serious as mismatch between the line and the set. In most cases, matching sections can be made from short pieces of commercially available line. Two useful equations for figuring matching sections are as follows: $Z_s = \sqrt{Z_1 Z_2}$ where Z_s is the section impedance, Z_1 is the line impedance, and Z_2 is the antenna center impedance (or input impedance) of set. To find the length of line (in feet) required for the section, $L = 234/\text{freq. (in mc.)}$.

If it is necessary to make up a section of line, use the charts in one of the handbooks, either "Reference Data for Radio Engineers," or the "A.R.R.L. Antenna Handbook," either of which is good.

The main points to remember in mountainous areas are that the an-

(*Continued on page* 108)

Over-all view of the Hallicrafters SR-75.

TRANSCEIVER for the NOVICE HAM

Details on a compact unit which is suitable either for Novice hams or as an emergency rig.

By
CLARK E. JACKSON

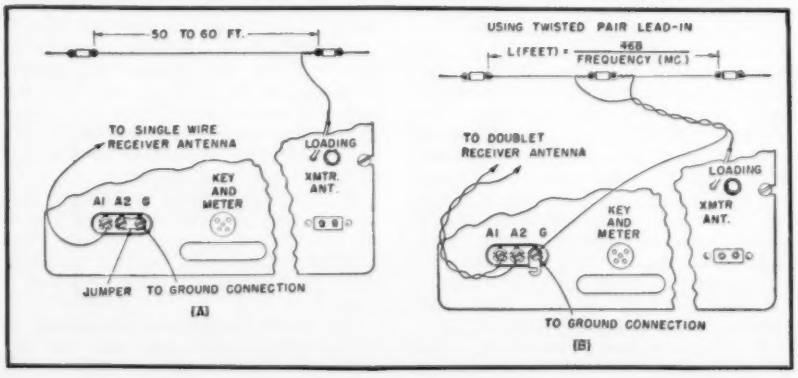
THERE are many Novices who will elect to build their own transmitters and receivers for use after July 1, 1951, providing they have received their Novice Licenses by that time. Others will take advantage of commercial products such as the one to be described.

The equipment illustrated is the *Hallicrafters* Model SR-75 Receiver-Transmitter which includes a complete all-wave radio receiver and a five-band, plug-in coil, c.w. transmitter rated at 10 watts input. Experience has shown that reliable contacts are made by amateurs using extremely low powered units. It is expected, therefore, that units used by the Novice will allow many DX contacts. Complete rules and regulations covering the new Novice and Technician classes of stations and licenses are given on page 38 of this issue. The transceiver to be described meets the requirements as set forth for these classifications.

The SR-75 may be used either as a fixed or portable amateur station as well as an auxiliary or emergency station. The unit may be powered from a 6 volt automobile storage battery in conjunction with a 6 volt d.c. to 115 volt a.c. vibrator pack capable of furnishing a minimum output power of fifty watts at from 40 to 125 cycles.

The receiver is electrically identical to the *Hallicrafters* Model S-38B receiver with the exception of the rectifier tube which is a 117Z6GT. This tube is used in a conventional voltage doubler circuit as shown in Fig. 2 which is the complete schematic of the transceiver.

Fig. 1. (A) Details for constructing a single-wire antenna suitable for use with the SR-75 transceiver. (B) Data for building and connecting a half-wave doublet antenna.



Transmitter

When connected as a transmitter, the unit comprises a c.w. crystal controlled oscillator employing a type 12BA6 pentode, controlled by a plug-in type crystal. A slide switch, located on the rear lip of the chassis, is used to operate the oscillator in a fundamental Pierce oscillator circuit or as a frequency doubler in a tri-tet circuit. The output of the crystal-controlled oscillator drives a class C amplifier comprising a 50L6GT and plug-in type tank coils. This same r.f. amplifier tube is also used as the audio power amplifier when the transceiver is switched to the "receiver" position. The output circuit consists of condensers C_{20}, C_{21} while the tank coil is a pi-network composed of the two tuning condensers and the plug-in coil selected for the operating frequency. This pi-network assures substantial harmonic reduction as well as flexibility in feeding various types of antenna systems with resistances ranging from 30 to 600 ohms. In the case of balanced systems, these may be fed with power if the transmission line is at least a quarter wave or longer at the operating frequency.

To eliminate electrical shock hazard, the keying of the final amplifier is accomplished by means of a relay whose power is supplied by two standard 1½ volt flashlight cells. A holder for these cells is contained within the receiver-transmitter cabinet. Because flashlight cells deteriorate with age, the transceiver comes from the factory without these batteries.

On the rear chassis lip is a 4-prong socket for connecting to the keying relay and to the plate circuit of the final amplifier. A 36" four-wire cable with plug for insertion into this socket is supplied and the two metering leads are provided with an insulated socket which mounts a pink bead, 2 volt, 60 ma. pilot bulb. Under resonant, no-load, key-down conditions, the class C

plate current is approximately 15-20 ma. which is not sufficient to light the indicator bulb. However, under off-resonance and load conditions the plate current is about 45 ma. which provides almost full brilliancy.

If the Novice wishes a more accurate indication of plate current and tuning resonance, it is recommended that he use a 0-100 ma. meter connected in place of the pilot lamp.

Antennas

It is necessary to use two separate antenna systems with the transceiver in order to obtain optimum results. The transmitting antenna may be in the form of a single-wire installation or a half-wave doublet. It is recommended that the doublet be used when transmitting on the higher frequency bands. Antenna heights between 35-75 feet are usually suitable for all bands. However, it is necessary to erect the antenna clear of surrounding objects if at all possible. Complete information on the design, construction, and application of many types of antennas has been given in past issues of this publication or may be found in any of the amateur radio handbooks.

(*Continued on page* 136)

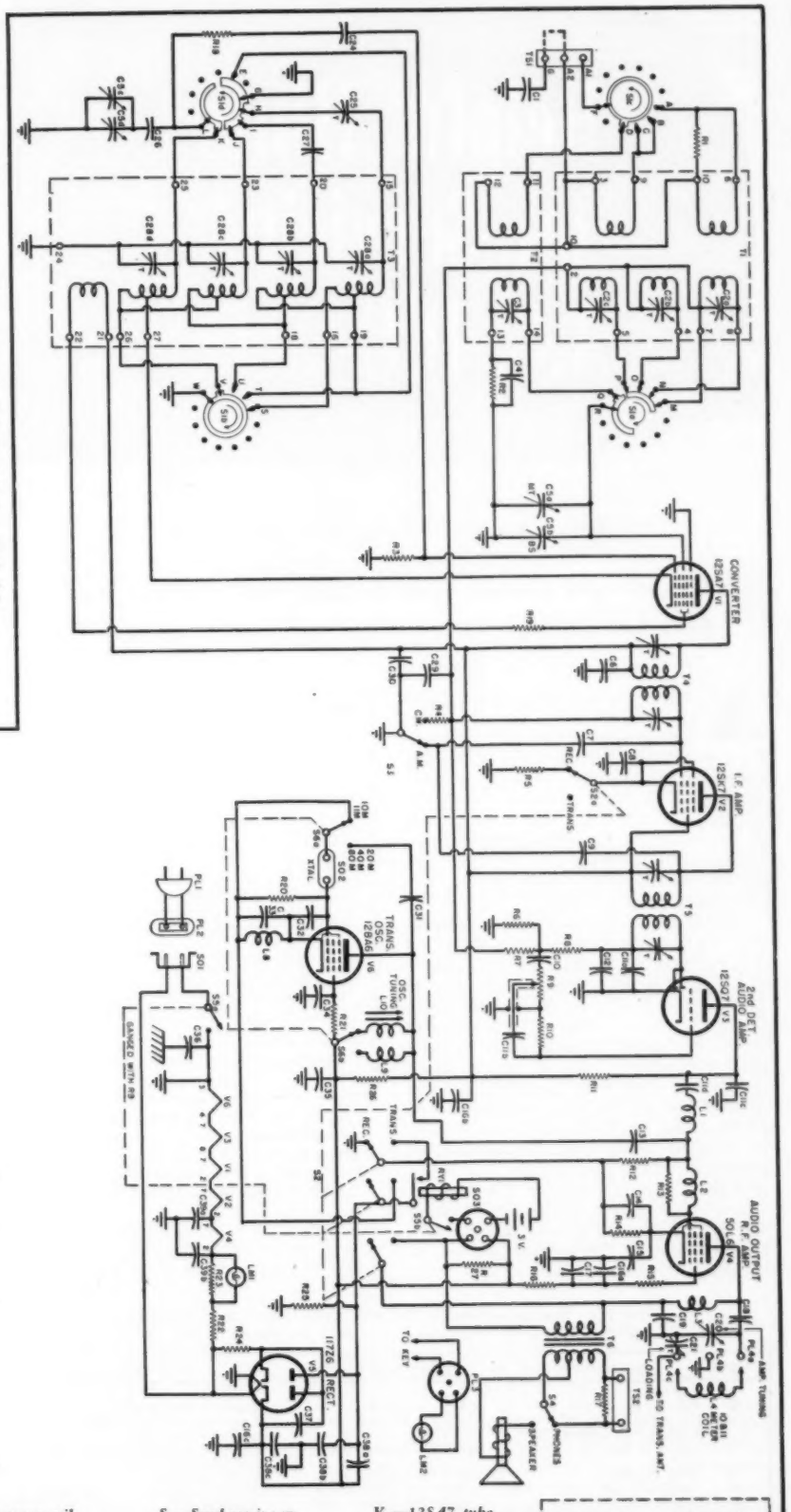


Fig. 2. Complete circuit diagram of the Hallicrafters model SR-75 transceiver.

R_1—10,000 ohm, ½ w. res.
R_2, R_6, R_{12}—470,000 ohm, ½ w. res.
R_3—22,000 ohm, ½ w. res.
R_4—470 ohm, ½ w. res.
R_5—390 ohm, ½ w. res.
R_7—2.2 megohm, ½ w. res.
R_8—47,000 ohm, ½ w. res.
R_9—2 megohm, ½ w. pot.
R_{10}—10 megohm, ½ w. res.
R_{11}—220,000 ohm, ½ w. res.
R_{13}—100,000 ohm, ½ w. res.
R_{14}—150 ohm, ½ w. res.
R_{15}, R_{16}—47 ohm, ½ w. res.
R_{16}—4700 ohm, ½ w. res.
R_{17}—15 ohm, ½ w. res.
R_{19}, R_{20}—22 ohm, ½ w. res.
R_{20}—56,000 ohm ½ w. res.
R_{21}—27,000 ohm, ½ w. res.
R_{22}—39 ohm, 2 w. res.
R_{23}—39 ohm, ½ w. res.
R_{25}—47,000 ohm, 1 w. res.
R_{26}—1200 ohm, ½ w. res.
R_{27}—100 ohm, ½ w. res.
C_1, C_{10}—.01 µfd., 600 v. cond.
C_{2a}, C_{2b}, C_{2c}, C_3, C_{21}, C_{25}, C_{26a}, C_{26b}, C_{26c} C_{34d}—Trimmer cond.
C_4—2700 µµfd., 400 v. cond.
C_{5a}, C_{5b}—Two-gang main tuning cond.
C_{5b}, C_{5d}—Two-gang bandspread cond.
C_6—.25 µfd., 400 v. cond.
C_7, C_{17}—Capacity formed by placement of wiring
C_{8a}, C_{26}—.05 µfd., 400 v. cond.
C_{11a}, C_{11c}, C_{24}—220 µµfd. mica cond.
C_{11b}—.002 µfd., 400 v. cond.
C_{11d}, C_{15}, C_{17}, C_{23}, C_{31}, C_{32}—.005 µfd., 400 v. cond.
C_{12}—100 µµfd. mica cond.
C_{13}—110 µµfd. mica cond.
C_{14}—30 µfd., 25 v. elec. cond.
C_{16a}, C_{16b}, C_{16c}—40/40/60 µfd., 250 v. elec. cond.
C_{18}—.001 µfd., 400 v. cond.
C_{19}, C_{22}—.02 µfd., 400 v. cond.
C_{20}—Var. air cond.
C_{27}—47 µµfd. mica cond.
C_{28}—120 µµfd. mica cond.
C_{29}—.003 µfd., 400 v. cond.
C_{37}, C_{38}—.0022 µfd., 400 v. cond.
C_{39}—24 µµfd. mica cond.
C_{40}—30 µµfd. mica cond.
C_{36}—.1 µfd., 600 v. cond.
C_{39a}, C_{39b} C_{39c}—40/40/40 µfd., 250 v. elec. cond.
C_{39d}, C_{39e}—Two-sec. .004 µfd., 400 v. cond.
L_1, L_2, L_3, L_4—R.f. choke
L_4—10 & 11 meter amplifier coil
L_5—20 meter amplifier coil
L_6—40 meter amplifier coil
L_7—80 meter amplifier coil
L_8—20, 40, & 80 meter osc. coil
L_{10}—10 & 11 meter osc. coil
T_1, T_2—Antenna coil
T_3—Conv. osc. coil
T_4—455 kc. input i.f. trans.
T_5—455 kc. output i.f. trans.
T_6—Output trans.
S_1—Bandswitch
S_2—Send-receive sw.
S_3—C.W.-AM sw.
S_4—Phone-speaker sw.
S_5—On-off sw.
S_6—Trans. bandswitch
LM_1, LM_2—Pilot lamp
V_1—12SA7 tube
V_2—12SK7 tube
V_3—12SQ7 tube
V_4—50L6GT tube
V_5—117Z6GT tube
V_6—12BA6 tube

Helpful Hints on Servicing A.C.-D.C. Sets

By T/SGT. JAY J. LUCAS, USAF

Simple test gadget speeds both "B" voltage and filament checks. It is fool-proof, and easy to use.

A TEST prod connected to ground through a 6 watt, 110 volt lamp, and a neon lamp will prove to be a real time saver when servicing radios of the a.c.-d.c. variety, as well as being useful for locating trouble in appliances. Although this article will be confined to describing procedures for use in repairing a.c.-d.c. sets, the reader will readily visualize its applications in other jobs.

The tester is shown schematically in Fig. 1A. It consists of two lamps, a *Mazda* type S6 6 watt, 110 volt lamp and a ¼ watt type NE-45 neon lamp. They may be mounted on the test panel by using standard 1 inch diameter pilot lamp assemblies with candelabra sockets, located where they are easily seen while peering in and around the radio being serviced. The connections for the test leads should be brought out through the panel. The other side of the lamps must terminate in a good ground. Either the neutral side of the house wiring or a good water-pipe ground should suffice. The effectiveness of the ground should be checked by connecting a test lead through the 6 watt lamp to the "hot" side of an outlet. The lamp will light with normal brilliancy if the ground is satisfactory. Obviously, the lamp will not light if the lead is connected to ground side of the outlet.

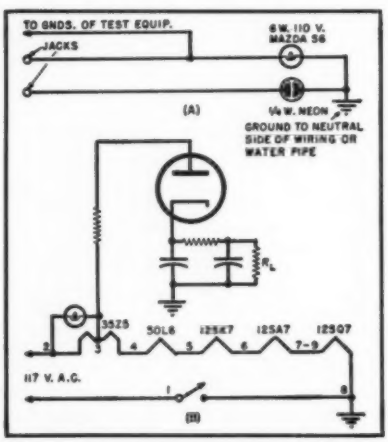


Fig. 1. (A) Wiring arrangement of test unit. (B) Conventional a.c.-d.c. series-type filament wiring. Numbered test points refer to Table 1. Line cord switch must be in closed position when making these tests.

While installing the lamps, it would be wise to connect ground leads to the signal generator, signal tracer, scope, etc., terminating them at the lead side of the 6 watt lamp. This will indicate when these instruments have been connected to a "hot" chassis, which is the usual cause of the annoying hum modulation experienced when using such instruments on a.c.-d.c. sets.

Little need be said about the theory involved in this simple device. The 6 watt lamp provides a low-resistance path to ground for small currents, but lights and limits the current to a safe value when the lead is connected to a hot-spot. When checking for burned out filaments in a series circuit, the lamp will light as long as all the tubes between the probe and the high side of the line are OK. The limiting action of the lamp eliminates any appreciable voltage drop through the tubes during the test. The neon lamp is essentially a voltage-operated device which will light with the presence of voltage without drawing appreciable current. It is used in cases where the current drawn by the 6 watt lamp would "upset" circuit conditions.

For the purpose of explanation, a typical a.c.-d.c. power circuit is shown in Fig. 1B. A large percentage of sets is represented by this basic diagram. The test points are numbered in logical sequence. Minor deviations from the procedures outlined will have to be made for other circuits, but after a little practice the reader will readily develop his own procedures.

Assuming the circuit given is applicable to the set being tested, the following steps should be followed:

Turn the set on, then plug it into the outlet. With the test probe connected to the 6 watt lamp jack, touch the prod to the chassis. If the lamp lights, the chassis is connected to the "hot" side of the line.

An exception to this will occur if the line switch is defective and does not close. A line cord or plug that is open between the switch and plug will also cause the lamp to light.

Trouble of this type may be detected by watching the test lamp when it is touched to the chassis. If the switch, line cord or plug is open, the lamp will light to almost full brilliancy and then gradually dim as the tube heaters warm up. A condition of this type would indicate that the polarity of the line cord is correct. It will also show that the filament string is operating properly but that there is an open in the grounded side of the line cord or switch.

If the lamp lights and holds its full brilliance, it would indicate that the line cord had not been properly polarized and we strongly recommend reversing the plug to avoid becoming an unwilling conductor of 110 volts. (A rubber safety mat is a good precautionary measure if the floor isn't "shockproof.") After re-

Table 1. Test procedure for checking open filaments, cord, and switch. Test points mentioned refer to those shown in Fig. 1B.

TEST	LAMP LIGHTS	DOES NOT LIGHT	REMEDY
1	See text		
2	OK	Line cord open	Replace cord or plug
3	OK, Check with pilot lamp temporarily removed.	35Z5 Fil. burned out at pilot tap	Replace tube, and check output tube (See text)
4	35Z5 Fil. OK	35Z5 Fil. burned out	Replace tube and check output tube (See text)
5	50L6 Fil. OK	50L6 Fil. burned out	Replace tube
6	12SK7 Fil. OK	12SK7 Fil. burned out	Replace tube
7	12SA7 Fil. OK	12SA7 Fil. burned out	Replace tube
Reverse line plug temporarily for tests 8 and 9.			
8	Line cord & switch OK ("Hot" chassis)	Defective switch or cord	Repair or replace defective part
9	12SQ7 Fil. OK	12SQ7 Fil. burned out	Replace tube
Return plug to original position so chassis is connected to neutral side of line and filaments are connected to "hot" side.			

versing the plug, recheck the chassis to make sure that there is no voltage present. If the tubes do not light, proceed with the tests outlined in Table 1.

Upon completion of the tests outlined, or if tubes warm up, indicating that all filaments are OK, the following "quickie" tests will show up the most common failures in a.c.-d.c. sets:

Check rectifier plate voltage. Connect probe to plate of rectifier. If lamp does not light, check the surge resistor.

Check rectifier output. Using the 6 watt lamp, connect probe to cathode of rectifier tube. If normal voltage is present, the lamp should light to normal brilliancy. The lamp will draw approximately 55 ma., so this test should not be prolonged. If the rectifier is good, it will withstand this test momentarily. If the emission is low, or if there is a defective filter, the lamp will not light brightly.

Check filter output. Place the probe on the screen connection of the output tube (pin 4 of the 50L6, in this case). Anything less than normal brilliancy in the 6 watt lamp indicates low capacity filters. If the set plays, this fault will usually show up as hum modulation and low volume. Checking the voltage with a meter usually indicates less than 90 volts when this trouble occurs. Replacing the filter condensers is the best remedy for this.

Check output transformer. If the set is dead and voltage is present at the screen of the power output tube, the output transformer is a logical suspect. Placing the test probe on the plate pin should light the lamp. (Don't be fooled by a shorted condenser between plate and screen of the output tube.)

Check output tube for filament-to-cathode leakage. This is a common cause of distortion. Although a tube checker will usually reveal a leakage, it may also be checked by connecting the test lead to the neon lamp, disconnecting the cathode bias and bypass, and connecting the probe to the cathode pin. Momentarily remove any of the tubes except the rectifier and output tube. This will cause the neon lamp to glow if there is a leakage. Another method is to leave the cathode circuit undisturbed, and let the set get warm. Then pull out one of the tubes farther down the line (12SA7 or 12SQ7) and carefully watch the 35Z5 and 50L6 filaments. If they continue to light or glow unusually long, there is a leakage in the output tube. The author always makes this check whenever a rectifier tube is replaced, as leakage in the output tube causes excessive voltage across the rectifier filaments and shortens the life of the tube. The latter check can be made without removing the chassis from the cabinet.

Check for plate and screen voltages on other tubes. The neon lamp will indicate the presence of practically all normal voltages in a.c.-d.c. sets as they are in the neighborhood of 90 to 120 volts, which is just sufficient to ionize

(*Continued on page* 135)

Mac's RADIO SERVICE SHOP

By JOHN T. FRYE

TV AND THE LITTLE GUY

BARNEY, the "electronic assistant" as he liked to call himself of Mac's Radio Service Shop, stepped inside the front door of the establishment and then stopped dead in his tracks and began to sniff the air like a retired fireman getting a whiff of shingle smoke.

"Oh-oh, Miss Perkins," he exclaimed accusingly to the office girl, "you've been splurging on a new perfume again. No, don't tell me what it is. Let me guess. I'm pretty good at this sort of thing: Hm-m-m-m," he said with his eyes tightly closed and his freckled face screwed up in a look of intense concentration, "it could be either *My Secret Sin* or *Mantrap,* but I seem to be getting just a *soupçon* of *Night of Love—*"

The topic of large TV service operations vs. the small is a controversial one. In the past we have presented the case for the large operation (see "Is the One Man TV Shop Doomed?" in the February 1950 issue and "TV Servicing is Big Business" in the March 1950 issue).

With this article we present the other side of the story with John T. Frye going to bat for the small operator.

We do not believe that there is any cut-and-dried answer to this question at the present. Only time will tell which type of operation can make the grade most successfully.

"I hate to throw your '*soupçon*' out of joint," Matilda interrupted with a giggle, "but you're not even warm. If you will stop making that noise like a punctured bellows and open your eyes, you will see that what you are smelling is *First April Hyacinths,* and they are right here in a vase on my desk."

"Yeah, M'sieu Jacques," Mac yelled from the service room, "quit waving that anteater proboscis of yours around and come on back here and put your nose to the grindstone where it belongs."

"Okay, okay!" Barney said amiably as he strolled back into the service department, "but I have a little matter I want to talk over with you before we start to work."

"Very well, Junior," Mac said as he shot an amused look at the youth, "but don't think you're fooling anybody. I'm hep to this business of your getting me started on a long-winded lecture just to stave off going to work; but what is the gimmick this time?"

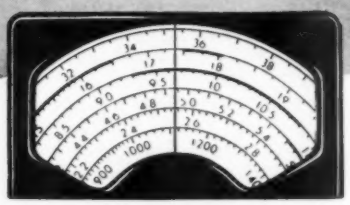
"Oh *no,* Boss," Barney denied with a pained expression. "You've got me all wrong. This thing really has me worried. Remember those magazines you told me to take home and read? Well, just before coming to work I finished an article in one of the publications intended for large service shop owners. This writer said television was finally spelling out the end of the 'screwdriver mechanics.' At first I thought the writer simply meant poorly-trained and sloppy technicians, but as I read on I found him calling these same people 'individual technicians' and 'one-man alley operators.' To him, apparently, a screwdriver mechanic and the operator of a one-man shop were the same person, and he was convinced that these characters were going to be about as common on the American scene as wild bison."

Mac lighted his pipe before he answered. "This *is* serious," he said with with a grin that belied his words. "Did the prophet of doom give any reasons for his pessimism?"

"Well, for one thing, he said the little-shop operator did not have either the equipment or the technical knowledge needed for TV servicing."

(*Continued on page* 137)

International SHORT-WAVE



***Compiled by* KENNETH R. BOORD**

ACCORDING to a release from the International Monitoring Service, San Carlos, California, its "free service to International Broadcasters, in and outside the United States" was discontinued as of January 1, until further notice. "Resumption of these services, which were performed in the interest of goodwill and better understanding between the peoples of one nation and another, will commence as soon as practical with relation to the necessary reorganization of our group caused by the current conflict and the ensuing national defense preparations. IMS extends its sincere appreciation to the hundreds of short-wave listeners throughout the world who so willingly and unselfishly cooperated with us in the past years in helping us to enable our services to cover a broader scope and serve a greater number of our friends who broadcast the world over."

* * *

Radio Club Notes

England—The International Short Wave Club, 100, Adams Gardens Estate, London, S.E. 16, in a recent monthly bulletin, said: "We will send details and a specimen copy of our publication to any address."

* * *

This Month's Schedules

(*NOTE*: This is the time of year when some stations will be going on *Summer Time*; in such cases, you may find schedules *advanced one hour* from those listed herein.—KRB)

Andorra—Radio Andorra, 5.992, noted with good level when tuned 1615. (Ferguson, N.C.) Logged recently by Oskay, N.J., on measured 5.9902 at 1648; severe CWQRM; man announced in French, woman announced in Spanish.

Angola—CR6RO, 7.582, Silva Porto, is heard in Sweden 1400-1500; CWQRM. (*Nattugglan*, Sweden) *Radio Australia* says this one is heard in South Africa at 1200-1505; QRA is P.O. Box 33, Silva Porto, Angola. Also reports CR6RE, 7.165, is heard in South Africa from 1300. Says CR6RG transmits daily at 1300-1500 on 9.760; that CR6RB, 9.165, is heard in South Africa at 1230-1500, fairly good strength; and that Louanda, 9.470, is heard from 1300 onwards.

CR6RD, 11.922.7, Nova Lisboa, noted 1340. (Oskay, N.J.)

Argentina—New SIRA schedules from Buenos Aires are listed—9.690, Spanish 1000-1100; French 1100-1200; Italian 1200-1300; Swedish 1300-1400; *English* 1400-1700; German 1700-1800; Spanish 1800-1900; *English* 1900-2100 and 2100-2400. On 15.290, Spanish 2100-0100, 1215-1545. On 11.880, Portuguese 0800-1300; French 1300-1430; *English* 1430-1600; French 1600-1700; Portuguese 1700-2230. On 9.455, *English* 1600-1750, 2130-0100. Still desires reports from listeners all over the world.

LRS, 9.315, Buenos Aires, *Radio Splendid*, noted in Spanish 2110-2133 and later. (Patterson, Ga.) LRT, 11.839, Tucuman, heard signing off 2258 after a march. (Russell, Calif.)

Australia—Latest schedules of *Radio Australia* are 1500-1655, VLC, 15.20, to New Zealand; 1500-1800 (Sat. to 1815), VLA8, 11.76, to British Isles, Europe; 1529-1800 (Sats. from 1559 to 1815), VLB11, 15.16, to Japan, N. Pacific; 1713-1950 (Fri. to 2100; Sat. 1729-2100), VLC9, 17.84, to South and Southeast Asia; 1815-1950 (Fri. to 2100; Sat. 1828-2100), VLA6, 15.20, to Southeast Asia, N.W. Australia; 1950-2230 (off Fri., Sat.), VLG11, 15.21, to Southeast Asia, N.W. Australia; 2145-2315 (Fri. 2056-2145; Sat. 2056-2315), VLB5, 21.54, to Japan, N. Pacific; 2330-0045, VLC9, 17.82, to South and Southeast Asia; 2330-0045 (off Fri.), VLB5, 21.54, to Africa; 2330-0045, VLA6, 15.20, to N. America (West Coast); 0045-0230, VLG11, 15.21, to Southeast Asia (including Thai language program Fri. 0200-0230); 0100-0140, VLC4, 15.32, to French Indo-China (in French); 0100-0140 (Tue.-Fri.), VLH5, 15.23, to Tahiti (in French); 0100-0140 (Sun., Mon.), VLA6, 15.20, to Tahiti (in French); 0100-0400 (except Sun., Mon.), VLA6, 15.20, to China (United Nations broadcast); 0155-0315, VLC10, 21.68, to British Isles, S. Asia; 0140-0315, VLB9, 9.58, to New Zealand, British Isles; 0200-0230 (Fri. only), VLG11, 15.21, to Thailand (in Thai); 0245-0345, VLG11, 15.21, to New Caledonia (in French); 0328-0450, VLB4, 11.85, to Japan, N. Pacific; 0400-0630 (Sun. and Mon. from 0328), VLA6, 15.20, to Japan, N. Pacific; 0328-0530, VLC4, 15.32, to South and Southeast Asia; 0500-0630, VLB4, 11.85, to Southeast Asia; 0530-0600, VLC4, 15.32, to Indonesia (in Indonesian); 0600-0630, VLC4, 15.32, to South and Southeast Asia; 0700-0900, VLC7, 11.81, to N. America (East Coast); 0900-1000, VLA6, 15.20, to British Isles, Europe, VLB4, 11.85, to South and Southeast Asia, and VLC7, 11.81, to N. America (Central and Mountain Time Zones); 1000-1115, VLC7, 11.81, to N. America (West Coast), and VLB4, 11.85, to South and Southeast Asia; 1015-1115, VLA6, 15.20, to Africa. Unless otherwise stated, all broadcasts are *English*.

Radio Australia's 11.76 channel noted 1645-55 with news; fair to good level in South Dakota. (Lane) Also reported by Hoffman, N. Y.

VLX (or is call VLX2?), 4.897, Perth, has news 0400, 0645, 0800; nice signal in Va. (Saylor) This one noted by Pearce, England, at 1035 with dance music, giving local time as "25 minutes to 12 a.m.;" signed off 1100 with "God Save the King."

VLQ3, 9.660, Brisbane, sends new QSL card depicting map of Australia; heard at 1450 with test before 1500 regular sign-on; reports should be sent to Box 293E, G.P.O., Brisbane, Queensland, Australia. (ISWC), London)

Bechuanaland—ZNB, 8.230, Mafeking, noted R-6 but with bad CWQRM at 1315; orchestral recordings. (Pearce,

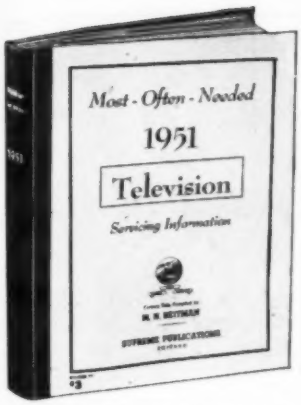
(*Continued on page* 99)

Front view of transmitter building at TGNA (Telling the Good News Abroad), missionary station in Guatemala City. The station has been licensed to operate on channels of 1180 kc., 6.040, 9.660, 11.850, 15.100, and 17.870 meters. The first three frequencies have been in use for some time and the 11.850 is expected to be in operation shortly.

(Note: Unless otherwise indicated, all time is expressed in American EST: add 5 hours for GCT. "News" refers to newscasts in the English language. In order to avoid confusion, the 24 hour clock has been used in designating the times of broadcasts. The hours from midnight until noon are shown as 0000 to 1200 while from 1 p.m. to midnight are shown as 1300 to 2400.)

The symbol "V" following a listed frequency indicates "varying." The station may operate either above or below the frequency given. "A" means frequency is approximate.

New SUPREME 1951 TV Manual



New 1951 Television Manual

This newest giant volume of the series covers 1951 factory data on all popular television sets of all makes. There are circuit explanations, 192 pages of alignment procedure, test patterns, response curves, pages of waveforms, voltage charts, service hints, and dozens of large double-page circuit diagrams. Manual style binding. At your parts jobber or by mail, only..... **$3**

1950 T-V Manual. Includes service material on all popular TV sets of all makes from Admiral to Zenith. Large size: 8½x11", plus ten mammoth 11x15" blueprints. Amazing bargain at only..... **$3**

1949 T-V Manual. Similar to the volume listed above. Has 192 extra-large pages, plus 9 double-spread giant blueprints. To order see coupon below, only..... **$3**

1948 T-V Manual. Earlier volume has material on all popular T-V sets of this period. Large size: 8½x11". Remarkable value. Including 8 fold-out blueprints, only... **$3**

1947 FM and T-V Manual. Covers all needed FM and television sets including popular R.C.A. 630TS. Size: 8½x11". Data on 192 pages. Only..... **$2**

INCLUDES ALL POPULAR SETS

The new 1951 TV manual has complete service material on every popular television set of every important manufacturer. Here is helpful, practical, factory-prepared data that will make servicing and adjustment easy for you. This new giant manual, as well as the previous volumes listed at left, has complete circuits, alignment facts, test patterns, response curves, service hints, voltage charts, waveforms, recommended changes for improvement, and many double-spread diagram blueprints. Here is your TV service material to help you become an expert, and at only $3 and $2 per manual.

FIND—FIX ALL T-V FAULTS

Use the new 1951 TV manual and the earlier volumes (see listing at left) to help you with all TV repairs. Cuts hour-wasting jobs to pleasant moments. Use test patterns for quick adjustment, or look up probable cause of trouble in the pages of hints after simply observing fault in video picture. No equipment needed with these tests. Or use your voltmeter and compare values with many voltage charts included. With an oscilloscope you can get waveforms similar to hundreds illustrated using test points suggested and in a flash locate what used-to-be a hard-to-find fault. Order at our risk for a 10-day trial. Use coupon at bottom of page.

AMAZING BARGAIN OFFER

The new 1951 TV manual is the most remarkable value offered by **Supreme Publications** in their 17 years of business. This giant-size television servicing manual at only $3, or the TV manuals for previous years for only $3 and $2 each, are amazing bargains and defy competition. There is nothing else like them. Each manual is a virtual treatise on practical television repairs. By normal standards, each such large manual packed as it is with practical facts, hundreds of illustrations, diagrams, charts, photographs, and expensive extra-large blueprints, should sell for $10—but as SUPREME special values they are priced at $3 and $2 each. Only a publisher who sold over one million television and radio manuals can offer such bargains based on tremendous volume-sales.

YOURS TO USE ON TRIAL

Be ready to repair any TV set by having in your shop all five **Television Manuals** described at left. Or try the new 1951 TV manual to see what an amazing bargain you get for only $3. Order on no-risk trial by using coupon at bottom of page.

All **Supreme Publications** TV and Radio manuals are compiled by M. Beitman, radio engineer, teacher, author, and serviceman.

SUPREME RADIO MANUALS

New 1950 Radio Diagrams

Now you can benefit and save money with **Supreme** amazing manual scoop. This one giant volume has all the service data you need on all recent radio sets. Here you have clearly-printed large schematics, needed alignment data, parts lists, voltage values, and information on stage gain, location of trimmers, and dial stringing illustrations. This is the help you need to find tough faults in a jiffy. The new 1950 radio manual is a worthy companion to the 9 previous volumes used to an advantage by over 128,000 shrewd radio men.

BIGGEST BARGAIN IN SERVICE DATA

Wise servicemen know that **Supreme Publications** manuals have all the material needed at the lowest prices. For the remarkable bargain price (only $2 for most volumes) you are assured of having on hand needed diagrams and all other essential repair facts on almost all sets you will ever service. Every popular radio of all makes, from old-timers to new 1950 sets is covered. Select manuals wanted, see list below.

SUPREME RADIO MANUALS for PREVIOUS YEARS

1949 1948 1947 1946 1942 1941 1940 1939 | 1926-1938

SUPREME Most-Often-Needed RADIO DIAGRAMS Each Manual only $2. (1949 is $2.50); 192 pages of diagrams, alignment data, voltage values, parts lists, and service hints; large size, 8½"x 11". To order, see coupon below.

RADIO Diagrams 240 Pages Price $2.50

RADIO-ELECTRONICS HOME-STUDY COURSE

ONLY $3.95 COMPLETE 3 VOLUMES 53 Lessons

NEW AMAZING OFFER

Here is the most amazing bargain in radio training. The price scoop of the year. For only $3.95 (full price) you receive a complete radio-electronics course of 53 large, fact-packed lessons. Covers every topic of radio fundamentals, practical servicing, TV, FM, audio, and industrial electronics. Published in three giant books, bound in one super-mammoth volume. Printed in 1951. Compares lesson by lesson with the best $200 home-study correspondence courses; but here you get all lessons at one time at the unheard-of bargain price of only $3.95; nothing further to pay or buy.

THREE COURSES IN ONE

The complete training of these 53 large lessons is really THREE distinct courses on: (1) Practical Radio, (2) Applied Electronics, and (3) Radio Servicing. The lessons are clear, practical, easy to master and use. Early lessons will make fundamentals clear even to a beginner, while other lessons will give you the practical "know-how" of an expert. Notice in the illustration of the manuals, at top, that the wide column on each page has the text, while the narrow column contains pertinent explanations usually supplied by a teacher. These teacher comments guide you over the hard parts, stress points of importance, tell you how to perform practical experiments using any home radio. There are hundreds of review self-testing questions, 427 drawings, pictures, diagrams, and over a thousand service hints.

YOURS TO TRY FOR 10 DAYS

Just send no-risk coupon, at right, and receive the **3-volume COURSE** for a free examination. Use all this material a full 10 days in your own home. Read a few lessons, examine the hundreds of illustrations, apply some of the hints to fix a couple of radios. Only then, if you are pleased, the complete course of 53 lessons, in three volumes, is yours to keep for only $3.95, full price; otherwise, it costs you nothing for the use and examination. Fair enough? Please rush coupon or ask your jobber while your special price is still only..... **$3.95**

Supreme Publications

Sold by All Leading Radio Jobbers

NO-RISK TRIAL ORDER COUPON

SUPREME PUBLICATIONS, 3727 W. 13 St., Chicago 23, ILL.

Send the manuals checked below and at right. You guarantee satisfaction or money back.

- ☐ **New 1951 Television Service Manual**..... **$3.**
- ☐ **1950 Television** Manual, **$3.** ☐ **1949 TV, $3.**
- ☐ **1948 TV, $3.** ☐ **1947 TV & FM,** only **$2.**
- ☐ **Radio & Electronics Course,** 53 lessons.. **$3.95**

☐ I am enclosing $..... Send postpaid.
☐ Send C.O.D. I am enclosing $... deposit.

Name: .....

Address: .....

Most-Often-Needed Radio Diagram Manuals

- ☐ *New* 1950 Manual, $2.50
- ☐ 1949 Radio Manual, $2.50
- ☐ 1948
- ☐ 1947
- ☐ 1946
- ☐ 1942
- ☐ 1941
- ☐ 1940
- ☐ 1939

RADIO MANUALS — **PRICED AT ONLY $2 EACH**

- ☐ 1926-1938 Manual, $2.50

Heathkit MODEL 0-6 . . . PUSH-PULL . . . 5"
OSCILLOSCOPE KIT

The new Heathkit 5" Push-Pull Oscilloscope Kit is again the best buy. No other kit offers half the features — check them.

Measure either AC or DC on this new scope — the first oscilloscope under $100.00 with a DC amplifier.

The vertical amplifier has frequency compensated step attenuator input into a cathode follower stage. The gain control is of the non frequency discriminating type—accurate response at any setting. A push-pull pentode stage feeds the CR tube. New type positioning control has wide range for observing any portion of the trace.

The horizontal amplifiers are direct coupled to the CR tube and may be used as either AC or DC amplifiers. Separate binding posts are provided for AC or DC.

The multivibrator type sweep generator has new frequency compensation for the wide range it covers: 15 cycles to over 100,000 cycles.

The new model 0-6 scope uses 10 tubes in all, including 5" CR tube. Has improved amplifiers for better response useful to 2 megacycles. Tremendous sensitivity .04V RMS per inch horizontal — .09V RMS per inch vertical. Only Heathkit Scopes have all the features.

New husky heavy duty power transformer has 50% more laminations. It runs cool and has the lowest possible magnetic field. A complete eletrostatic shield covers primary and other necessary windings and has lead brought out for proper grounding.

The new filter condenser has separate sections for the vertical and horizontal screen grids and prevents interaction between them. An improved intensity circuit provides almost double previous brilliance and better intensity modulation.

A new synchronization circuit allows the trace to be synchronized with either the positive or negative pulse, an important feature in observing the complex pulses encountered in television servicing.

The magnetic alloy shield supplied for the CR tube is of new design and uses a special metal developed by Allegheny Ludlum for such applications.

The kit is complete, all tubes, cabinet, transformer, controls, grid screen, tube shield, etc. The instruction manual has complete step-by-step assembly and pictorials of every section. Compare it with all others and you will buy a Heathkit.

Model 0-6..... Shipping Wt. 24 lbs.

$39.50

NEW INEXPENSIVE Heathkit
ELECTRONIC SWITCH KIT

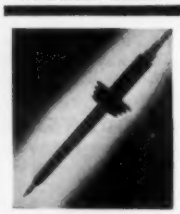
Model S-2
Shipping Wt. 11 lbs.

$19.50

The companion piece to a scope — Feed two different signals into the switch, connect its output to a scope, and you can observe both signals — each as an individual trace. Gain of each input is easily set (gain A and gain B controls), the switching frequency is simple to adjust (coarse and fine frequency controls) and the traces can be superimposed for comparison or separated for individual study (position control).

Use the switch to see distortion, phase shift, clipping due to improper bias, both the input and output traces of an amplifier, — as a square wave generator over limited range.

The kit is complete; all tubes, switches, cabinet, power transformer and all other parts, plus a clear detailed construction manual.



$5.50

Heathkit 30,000V DC PROBE KIT

A new 30,000 V DC Probe Kit to handle high voltages with safety. For TV service work and all other high voltage applications. Sleek looking — Two color molded plastic — Red body and guard — jet black handle. Comes with connector, cable, and PL55 type plug. Plugs into Heathkit VTVM so that 300V scale is conveniently multiplied by 100. Can be used with any standard 11 megohm VTVM.

No. 336 High Voltage Probe Kit.....Shipping Wt. 2 lbs.

Heathkit
RF PROBE KIT

Shipping Wt. 1 lb.

$5.50

This RF Probe Kit comes complete with probe housing, crystal diode detector, connector, lead and plug and all other parts plus clear assembly instructions. Extends range of Heathkit VTVM to 250 Mc. ± 10%. Works on any 11 megohm input VTVM. Specify No. 309 RF Probe Kit.

New MODEL V-4A
Heathkit
VTVM KIT

Model V-4A .....Shipping Wt. 8 lbs.

Note New Low Price

$23.50

The new Heathkit Model V-4A VTVM Kit measures up to 30,000 Volts DC and 250 megacycles when used with accessory probes — think of it, all in one electronic instrument more useful than ever before. The AC Voltmeter is so flat and extended in its response (± 1 db from 20 cycles to 2 megacycles) that it eliminates the need for separate expensive AC VTVM's.

The new 200 microampere, 4½" streamline meter with quality Simpson movement (five times as sensitive as the commonly used 1 MA meter) has a shatter proof plastic meter face for maximum protection. Meter has all the desirable scales and indicates AC volts, DC volts, ohms, db (direct reading), and even has a special zero center marking for quick FM alignment.

There are six complete ranges for each function. Four functions give total of 24 ranges. The 3 volt range allows 33⅓% of the scale for reading 1 volt, as against only 20% of the scale on the 5 volt types.

New ½% ceramic precision resistors are the most accurate commercial type available — you find the same make and quality in the finest laboratory equipment selling for thousands of dollars. The entire voltage divider decade uses these ½% resistors.

Both AC and DC voltmeter measurements use a push-pull electronic voltmeter circuit, and the meter circuit makes the meter burn-out proof. Electronic ohmmeter circuit measures resistance over the amazing range of 1/10 ohm to one billion ohms, all with internal 3 volt battery. Ohmmeter batteries mount on the chassis in snap-in mounting for easy replacement.

Voltage ranges are full scale — 3 Volts, 10 Volts, 30 Volts, 100 Volts, 300 Volts, 1000 Volts. Complete decading coverage without gaps.

The DC probe is isolated for dynamic measurements. Negligible circuit loading. Gets the accurate reading without disturbing the operation of the equipment under test. Kit comes complete: cabinet, transformer, Simpson meter, test leads, complete assembly and instruction manual.

EXPORT AGENTS
ROCKE INTERNATIONAL CORP.
13 E. 40th ST.
NEW YORK CITY (16)
CABLE ARLAB N.Y.

The HEATH COMPANY
. . . BENTON HARBOR 15, MICHIGAN

NEW Heathkit TV ALIGNMENT GENERATOR KIT

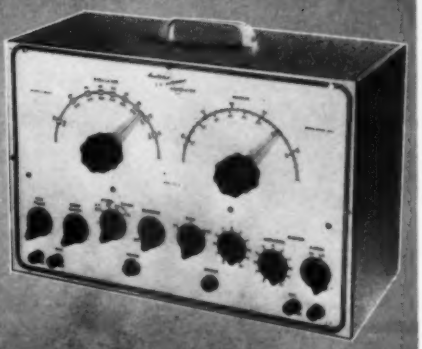
Here is an excellent TV Alignment Generator designed to do TV service work quickly, easily, and properly. The model TS-2 when used in conjunction with an oscilloscope provides a means of correctly aligning television receivers.

The instrument provides a frequency modulated signal covering, in two bands, the range of 10 to 90 Mc. and 150 to 230 Mc. — thus, ALL ALLOCATED TV CHANNELS AS WELL AS IF FREQUENCIES ARE COVERED.

An absorption type frequency marker covers from 20 to 75 Mc. in two ranges — therefore, you have a simple, convenient means of frequency checking of IF's, independent of oscillator calibration.

Sweep width is controlled from the front panel and covers a sweep deviation of 0-12 Mc. — all the sweep you could possibly need or want.

And still other excellent features are: Horizontal sweep voltage available at the front panel (and controlled with a phasing control) — both step and continuously variable attenuation for setting the output signal to the desired level — a convenient instrument stand-by position — vernier drive of both oscillator and marker tuning condensers — and blanking for establishing a single trace with base reference level. Make your work easier, save time, and repair with confidence — order your Heathkit TV Alignment Generator now!



$39.50

Model TS-2
Shipping Wt. ..... 20 lbs.

Heathkit SIGNAL GENERATOR KIT

Model SG-6
Shipping Wt. 7 lbs.

$19.50

The new Heathkit Signal Generator Kit has dozens of improvements. Covers the extended range of 160 Kc to 50 megacycles on fundamentals and up to 150 megacycles on useful calibrated harmonics; makes this Heathkit ideal as a marker oscillator for TV. Output level can be conveniently set by means of both step attenuator and continuously variable output controls. Instrument has new miniature HF tubes to easily handle the high frequencies covered.

Uses 6C4 master oscillator and 6C4 sine wave audio oscillator. The kit is transformer operated and a husky selenium rectifier is used in the power supply. All coils are precision wound and checked for calibration making only one adjustment necessary for all bands.

New sine wave audio oscillator provides internal modulation and is also available for external audio testing. Switch provided allows the oscillator to be modulated by an external audio oscillator for fidelity testing of receivers. Comes complete, all tubes, cabinet, test leads, every part. The instruction manual has step-by-step instructions and pictorials. It's easy and fun to build a Heathkit Model SG-6 Signal Generator.

Heathkit SIGNAL TRACER and UNIVERSAL TEST SPEAKER KIT

Model T-2
Shipping Wt. ..... 7 lbs.

$19.50

The popular Heathkit Signal Tracer has now been combined with a universal test speaker at no increase in price. The same high quality tracer follows signal from antenna to speaker — locates intermittents — finds defective parts quicker — saves valuable service time — gives greater income per service hour. Works equally well on broadcast, FM, or TV receivers. The test speaker has an assortment of switching ranges to match either push-pull or single output impedances. Also tests microphones, pickups and PA systems. Comes complete: cabinet, 110V 60 cycle power transformer, tubes, test probe, all necessary parts, and detailed instructions for assembly and use.

Heathkit CONDENSER CHECKER KIT

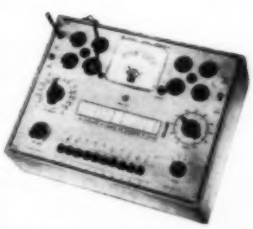
$19.50

Checks all types of condensers — paper, mica, ceramic, electrolytic. All condenser scales are direct reading and require no charts or multipliers. Covers range of .00001 MFD to 1000 MFD. A Condenser Checker that anyone can read. A leakage test and polarizing voltage for 20 to 500 V provided. Measures power factor of electrolytics between 0% and 50% and reads resistance from 100 ohms to 5 megohms. The magic eye indicator makes testing easy.

The kit is 110V 60 cycle transformer operated and comes complete with rectifier tube, magic eye tube, cabinet, calibrated panel and all other parts. Has clear detailed instructions for assembly and use.

Model C-2 ..... Shipping Wt. 6 lbs.

Heathkit TUBE CHECKER KIT



Model TC-1
Shipping Wt. 12 lbs.

$29.50

Test your tubes the modern way — dynamically — the simplest, yet fastest and surest method — your Heathkit has a switch for each tube element and measures that element — no chance for open or shorted elements slipping by, all the advantages of the mutual conductance type without the slow cumbersome time consuming setups. Checks for opens, shorts, each element individually, filament and filament tap continuity, and emission.

This Tube Checker has all the features — beautiful 3 color BAD-?-GOOD meter — complete selection of voltages — roller chart listing hundreds of tubes including the new 9 pin miniatures — finest quality Centralab lever switches — high grade birch, counter-type cabinet — continuously variable line adjust control — every feature you need to sell tubes properly. The most modern type tube checker with complete protection against obsolescence. Uses only the best of parts — rugged oversize 110V 60 cycle power transformer, finest of Mallory and Centralab switches and controls, complete set of sockets for all type tubes with blank spare for future types. Fast action, gear driven roller chart quickly locates the setting for any type tube. Simplified switching cuts necessary testing time to a minimum and saves valuable service time. Simple method allows instant setup of new tube types without waiting for factory data. No matter what the arrangement of tube elements is, the Heathkit flexible switching method easily handles it. Order your Heathkit Tube Checker Kit today and see for yourself that Heath again saves you two-thirds and yet retains all the quality. Complete with instructions, all parts, and cabinet.

NEW Heathkit HANDITESTER KIT

$13.50

A precision portable volt-ohm-milliammeter. Uses only high quality parts — All precision ½% resistors, three deck switch for trouble-free mounting of parts, specially designed battery mounting bracket, smooth acting ohm adjust control, beautiful molded bakelite case, 400 microamp meter movement, etc.

DC and AC voltage ranges 10-30-300-1000-5000V. Ohms range 0-3000 and 0-300,000 Range Milliamperes 0-10 Ma, 0-100 Ma. Easily assembled from complete instructions and pictorial diagrams.

Model M-1 ..... Shipping Wt. 3 lbs.

EXPORT AGENT
ROCKE INTERNATIONAL CORP.
13 E. 40th ST.
NEW YORK CITY (16)
CABLE ARLAB N.Y.

The HEATH COMPANY
. . . BENTON HARBOR 15, MICHIGAN

NEW *Heathkit*

IMPEDANCE BRIDGE KIT

This Impedance Bridge Kit is really a favorite with schools, industrial laboratories, and serious experimenters. An invaluable instrument for those doing electrical measurements work. Reads resistance from .01 Ohms to 10 megohms, capacitance from .00001 MFD to 100 MFD, inductance from 10 microhenries to 100 henries, dissipation factor from .002 to 1, and storage factor from 1 to 1000. And you don't have to worry about selecting the proper bridge circuit for the various measurements — the instrument automatically makes the correct circuit when you set up for taking the measurement you want. Bridge utilizes Wheatsone, Hay, Maxwell, and capacitance comparison circuits for the wide range and types of measurements possible. And it's self powered — has internal battery and General Radio 1000 cycle hummer. No extérnal generator required — has provisions for external generator if measurements at other than 1000 cycles are desired.

Kit utilizes only highest quality parts, General Radio main calibrated control, General Radio hummer, Mallory ceramic switches, excellent 200 microamp zero center galvanometer, laboratory type binding posts with standard ¾ inch centers, ½% precision ceramic-body type multiplier resistors, beautiful birch cabinet and ready calibrated panel. (Headphones not included.)

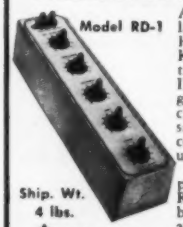
Model IB-1B...Shipping Wt. 15 lbs.

$69.50

Take the guesswork out of electrical measurements — order your Heathkit Impedance Bridge Kit today — you'll like it.

Heathkit LABORATORY

RESISTANCE DECADE KIT



Model RD-1

Ship. Wt. 4 lbs.

$19.50

An indispensable piece of laboratory equipment — the Heathkit Resistance Decade Kit gives you resistance settings from 1 to 99,999 ohms IN ONE OHM STEPS. For greatest accuracy, ½% precision ceramic-body type resistors and highest quality ceramic wafer switches are used.

Designed to match the impedance bridge above, the Resistance Decade Kit has a beautiful birch cabinet and attractive panel. It's easy to build, and comes complete with all parts and construction manual.

Heathkit LABORATORY

POWER SUPPLY KIT

Every experimenter needs a good power supply for electronic setups of all kinds. This unit has been expressly designed to act as a HV supply and a 6.3 V filament voltage source.

Voltage control allows selection of HV output desired (continuously variable within limits outlined), and a Volts — Ma switch provides choice of output metering. A large, plainly marked, and direct reading meter scale indicates either DC voltage output in volts or DC current output in Ma. (Range of meter 0-500V DC, 0-200 Ma DC). Instrument has convenient stand-by position and pilot light.

Comes with power transformer, filament transformer, meter, 5Y3 rectifier, two 1619 control tubes, completely punched and formed chassis, panel, cabinet, detailed construction manual, and all other parts to make the kit complete.

LIMITS:

No load	Variable 150-400V DC
25 Ma	Variable 30-310V DC
50 Ma	Variable 25-250V DC
Higher loads	Voltage drops off proportionally

Model PS-1
Ship. Wt. 20 lbs.

$29.50

Heathkit

BATTERY ELIMINATOR KIT

Model BE-2
Ship. Wt. 19 lbs.

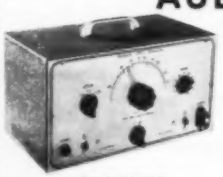
$22.50

A few auto radio repair jobs will pay for the Heathkit Battery Eliminator Kit. It's fast for service. The voltage can be lowered to find sticky vibrators or raised to ferret out intermittents. Provides variable DC voltage 5 to 7½ Volts at 10 Amps. continuous or 15 Amps. intermittent.

Also serves as storage battery charger. A well filtered, rugged power supply uses heavy duty selenium rectifier, a husky choke, and a 4000 MFD electrolytic condenser for clean DC. 0-15V voltmeter indicates output which is variable in eight steps. Better be equipped for all types of service — it means more income.

NEW *Heathkit* SINE and SQUARE WAVE

AUDIO GENERATOR KIT



Model AG-7
Ship. Wt. 15 lbs.

$34.50

We proudly present the NEW MODEL Sine and Square Wave Audio Generator Kit. Designed with versatility, usefulness, and dependability in mind, the AG-7 gives you the two most needed waveshapes right at your fingertips — the sine wave and the square wave.

The range switch and plainly calibrated frequency scale give rapid and easy frequency selection, and the output control permits setting the output to any desired level.

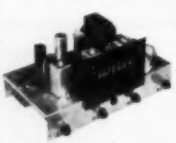
A high-low impedance switch sets the instrument for either high or low impedance output — on high to connect to high impedance load, and on low to work into a low impedance transformer with negligible DC resistance.

Coverage is from 20 to 20,000 cycles, and distortion is at a minimum — you can readily trust the output waveshape.

6 tubes, quality 4 gang tuning condenser, power transformer, metal cased filter condenser, ½% precision resistors in the frequency determining circuit, and all other parts come with the kit — plus, a complete construction manual. A tremendous kit, and the price is truly low.

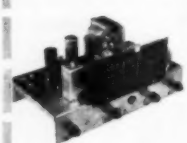
TWO HIGH QUALITY *Heathkit* SUPERHETERODYNE

RECEIVER KITS



Model BR-1 Broadcast Model Kit covers 550 to 1600 Kc. Shipping Wt. 10 lbs.

$19.50



Model AR-1 3 Band Receiver Kit covers 550 Kc. to over 20 Mc. continuous. Extremely high sensitivity. Shipping Wt. 10 lbs.

$23.50

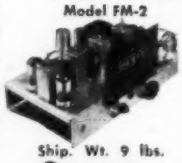
Two new Heathkits. Ideal for schools, replacement of worn out receivers, amateurs and custom installations.

Both are transformer operated quality units. The best of materials used throughout — six inch calibrated slide rule dial — quality power output transformers — dual iron core shielded I.F. coils — metal cased filter condenser. The chassis has phono input jack, 110 Volt output for phono motor, and there is a phono-radio switch on panel. A large metal panel simplifying installation in used console cabinets is included. Comes complete with tubes and instruction manual incorporating pictorials and step-by-step instructions (less speaker and cabinet). The three band model has simple coil turret which is assembled separately for ease of construction.

Heathkit

FM TUNER KIT

Model FM-2



Ship. Wt. 9 lbs.

$22.50

The Heathkit FM Tuner Model FM-2 was designed for best tonal reproduction. The circuit incorporates the most desirable FM features — true FM.

Utilizes 8 tubes: 7E5 Oscillator, 6SH7 mixer, two 6SH7 IF amplifiers, 6SH7 limiter, two 7C4 diodes as discriminator, and 6X5 rectifier.

The instrument is transformer operated making it safe for connection to any type receiver or amplifier. Has ready wound and adjusted RF coils, and 2 stages of 10.7 Mc IF (including limiter). A calibrated six inch slide rule dial has vernier drive for easy tuning. All parts and complete construction manual furnished.

EXPORT AGENT
ROCKE INTERNATIONAL CORP.
13 E. 40th ST.
NEW YORK CITY (16)
CABLE ARLAB N.Y.

The HEATH COMPANY

. . . BENTON HARBOR 15, MICHIGAN

Heathkit
ECONOMY . . . 6 WATT
AMPLIFIER KIT

$12.50

Model A-4. Ship. Wt. 8 lbs.

This new Heathkit Amplifier was designed to give quality reproduction and yet remain low in price. Has two preamp stages, phase inverter stage, and push-pull beam power output. Comes complete with six tubes, quality output transformer (to 3-4 ohm voice coil), husky cased power transformer and all other parts. Has tone and volume controls. Instruction manual has pictorial for easy assembly. Six watts output with response flat ± 1½ db from 50 to 15,000 cycles. A quality amplifier kit at a new low price. Better build one.

No. 304. 12 inch Speaker $6.95

Heathkit HIGH FIDELITY . . . 20 WATT
AMPLIFIER KIT

Model A-5
Shipping Wt. 15 lbs.

$21.50

The finest amplifier kit we have ever offered—check the features. This inexpensive amplifier compares favorably with instruments costing five times as much. Nothing has been spared to provide the best reproduction — an ideal amplifier for the new Heathkit FM Tuner.

Dual tone controls for control of both treble and bass. Bass control is of the boost type for maximum listening pleasure. Has inverse feedback to give excellent response over entire range. Tube lineup: 6SJ7 amplifier stage, 6J5 phase splitter stage, two 6L6's in push-pull output, and 5Y3 rectifier.

Has highest quality Chicago Transformer Corp. cased output transformer with taps of 3.2, 8, 15, 60 and 500 ohms to match any speaker combination. Tone control gives maximum bass boost of 6 db at 70 cycles. Amplifier has maximum gain of 75 db. Response within ± 3 db 20 to 20,000 cycles. Complete with all parts, tubes and instruction manual.

Model A-5A. Same as above except that a preamplifier stage with compensation has been added — consists of a 6SC7 and associated components for use with G. E. cartridge or microphone.

Model A-5A, Shipping Wt. ..... 15 lbs. $23.50

Heathkit RECEIVER AND TUNER CABINETS

$4.95

Blonde birch veneer cabinet for either of the receivers or tuner. The modern styling is an asset to any room. 5" speaker fits in end of cabinet when used with receivers. (Speaker not included.) Size 7 x 13½ x 18¼ inches. Order No. 345 for either receiver model. Specify No. 350 for the FM Tuner.

Shipping Wt. ..... 5 lbs.

Metal professional type communications receiver cabinet. Finished in deep grey and fits the panel supplied with Heathkit BR-1 and AR-1 Receivers. 5" speaker mounts in end of cabinet. (Speaker and panel shown not included with cabinet.) Gives professional appearance to Heathkit receivers. Size 7 x 14 x 7¾ inches.

Specify No. 335. Shipping Wt. 6 lbs.

$4.50

MAIL TO THE
HEATH COMPANY
BENTON HARBOR 15, MICHIGAN

ORDER BLANK

From _____

_____

_____

SHIP VIA
- ☐ Parcel Post
- ☐ Express
- ☐ Freight
- ☐ Best Way

Quantity	Item	Price	Quantity	Item	Price
	Heathkit Oscilloscope Kit — Model O-6			Heathkit R.F. Probe Kit — No. 309	
	Heathkit VTVM Kit — Model V-4A			Heathkit H.V. Probe Kit — No. 336	
	Heathkit FM Tuner Kit — FM-2			Heathkit R.F. Signal Gen. Kit — Model SG-6	
	Heathkit Broadcast Receiver Kit — Model BR-1			Heathkit Condenser Checker Kit — Model C-2	
	Heathkit Three Band Receiver Kit - Model AR-1			Heathkit Handitester Kit — Model M-1	
	Heathkit Amplifier Kit — Model A-4			Heathkit Power Supply Kit — Model PS-1	
	Heathkit Amplifier Kit — Model A-5 (or A-5A)			Heathkit Resistance Decade Kit — Model RD-1	
	Heathkit Tube Checker Kit — Model TC-1			Heathkit Impedance Bridge Kit — Model IB-1B	
	Heathkit Audio Generator Kit — Model AG-7				
	Heathkit Battery Eliminator Kit — Model BE-2				
	Heathkit Electronic Switch Kit — Model S-2				
	Heathkit T.V. Alignment Gen. Kit — TS-2				
	Heathkit Signal Tracer Kit — Model T-2				

On Parcel Post Orders, include postage for weight shown and insurance. (We insure all shipments.)

On Express Orders, do not include transportation charges — they will be collected by the Express Agency at time of delivery.

Enclosed find ☐ Check ☐ Money Order for _____

Please ship C.O.D. ☐ Postage enclosed for _____ lbs.

ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

EXPORT AGENT
ROCKE INTERNATIONAL CORP.
13 E. 40th ST.
NEW YORK CITY (16)
CABLE ARLAR N.Y.

The HEATH COMPANY
. . . BENTON HARBOR 15, MICHIGAN

SOMETHING NEW UNDER THE SUN

Who Says Prices Are Going Up?
Now at Sun They're Lower Than Ever.

Webster-Chicago Dictation
MODEL 18 **WIRE RECORDER**
Brand New—Discontinued Model

Includes microphone with stand, ¼ hour spool wire, plastic dust cover, and removable foot switch.

Dictation • Transcription • Playback

For Doctors, Dentists, Lawyers, Accountants, Secretaries, Clergymen, Speakers, Businessmen, Hams, etc.

Includes the following exclusive Webster-Chicago features:

- Automatic Stops—shut off machine at end of wire
- Pushbutton record-listen switch
- Immediate playback thru 2 inch speaker
- Neon recording volume indicator
- Removable take-up drum
- Elapsed time indicator

DRASTICALLY REDUCED FROM ORIGINAL PRICE OF $135.00 TO AN ALL TIME LOW OF

RECORDING WIRE	
1 hour	$3.50
½ hour	2.10
¼ hour	1.40

ONLY $89.50

Portable Carrying Case — Reg. $12.50 — Only **$8.95**

CRYSTALS FOR S.S.B. EXCITER

Also many other uses—in FT 241-A Holder—½" Pin SPC. Marked in 54th OR 72nd Harmonic MC Freq. Listed Below by Fundamental Frequency. Fractions Omitted. Lo Freq.

412 433 472 492
413 434 473 493
414 435 474 496
415 436 477 497
416 438 479 503
418 440 481 504
419 441 483 506
420 442 484 507
422 443 485 509
423 444 487 511
424 446 488 516
425 447 490 518
426 448 491 519
427 462
429 468
431

EACH **49c**

390 401
391 402
392 403
393 404
394 405
395 408
396 409
400 411

EACH **79c**

372 381
374 383
375 384
376 386
377 387
379 388
380

EACH **39c**

450 530
452 531
461 533
465 537
526 538

EACH **99c**

SPECIAL 200 KC XTALS without Holders. 21/23 x 23/32
69c ea. 3 for **$2**

HAM CRYSTALS

4190 6873 7840
5030 6906 7873
5485 6973 7906
6006 7740 7973
6040 7773 8273
6073 7806 8306
6106
6140
6173
6206
6773

EACH **49c**
10 for $4.50

3735 5850 6406 6705 7506
5305 5873 6425 6740 7540
5677 6875 6440 6806 7573
5706 5900 6450 7306 7640
5740 5906 6473 7340 7673
5750 5925 6475 7373 7706
5760 5940 6506 7406 7806
5773 5973 6540 7440 8340
5775 5975 6573 7473
5806 6273 6606
5825 6340 6640
5840 6373 6673

99c EACH
10 for $9.00

SCR-522 XTALS

5910 7480
6370 7580
6450 7810
6470
6407.9
6522.9
6547.9

EACH **$1.29**

BC-610 XTALS

2 BANANA PLUGS—¾" SPC.

2045 2220 2360 2557 3520
2105 2258 2390 3202 3550
2125 2260 2415 3215 3570
2145 2282 2435 3237 3580
2155 2300 2442 3250 3945
2305 2532 3322 3955
2320 2545 3510 3995

Payments must accompany order. Enclose 20c for Postage & Handling. Crystal shipped packed in cloth bags. All Shipments Guaranteed.

TERMS: All items F. O. B., Washington, D. C. All orders $30.00 or less, cash with order. Above $30.00, 25 per cent with order, balance C. O. D. Foreign orders cash with orders, plus exchange rate.

SUN RADIO
OF WASHINGTON, D. C.
938 F STREET, N. W. WASH 4, D. C.

NEW TV PRODUCTS on the Market

NEW YAGI LINE

Channel Master Corporation of Ellenville, New York has announced a new and complete line of yagi antennas which have been designated the "500" series.

Available for Channels 2 through 13, these antennas combine high gain with high directivity and an actual gain of 8 db.—a gain which can be increased by stacking. The new yagis have a front-to-back ratio of 26 db. to reduce rear and side pickup and match both 72 and 300 ohm line.

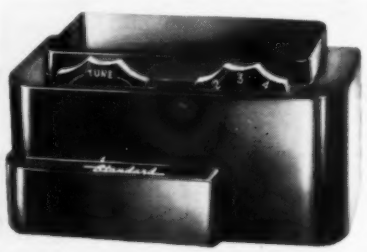
Construction features include aluminum elements and crossarm, high impedance step-up dipoles of seamless tubing, and reflectors and directors of ⅜" butted tubing with ½" external sleeve.

Literature on these new yagis is available from the company.

TELEVISION BOOSTER

Standard Coil Products Co., Inc., 2329 North Pulaski Road, Chicago 39, Illinois is currently marketing a new and improved television booster, the Model B-51.

Designed for applications in fringe



or other difficult reception areas, the "Standard Booster" is styled in a dark brown plastic cabinet that harmonizes with most television receivers.

The new booster is a single-stage preamplifier featuring continuous one-knob tuning with no switching from high to low bands. The company claims high gain on all channels, with low noise factor and the use of printed circuits as additional features.

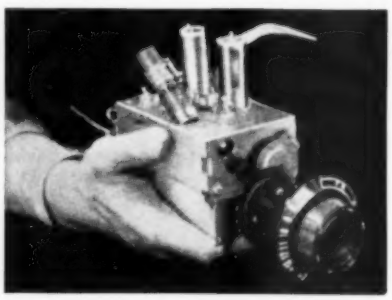
NEW INPUTUNER

The Electronic Parts Division of *Allen B. DuMont Laboratories, Inc.*, East Paterson, New Jersey has announced the availability of a new "Inputuner", the Series T3C.

Designed as a replacement, both mechanically and electrically, for a majority of switch-type tuners, the new unit provides one-knob, quick-click tuning of TV channels while retaining the continuous tuning feature for critical reception of TV and FM programs.

The simplified dial covers all TV and FM channels in only four turns and occupies the same panel area as indicating devices used on most switch-type tuners. The one-knob operation simply clicks into a TV channel and then fine-tunes for best reception.

The Series T3C is the jobber model



with dial while the Series T3B is the manufacturers' model. Both utilize the *Mallory-Ware* 3-gang spiral "Inductuner" plus antenna tuning which provides 4-circuit performance without extending the physical length of the chassis. Four models are available, aligned for a sound center i.f. of 21.25 or 21.75 mc., with or without a sound trap.

TUBE COATING

General Cement Mfg. Co. of 919 Taylor Avenue, Rockford, Illinois has developed a new fast-drying conductive coating for refinishing the outside of television picture tubes.

Designated "Tube Koat", the new material is designed to repair peeling or scratched coatings. It can also be used to coat the inside of television cabinets to prevent high voltage leaks and static discharges.

The company will supply full details on request.

TV TUBE CADDY

Of particular interest to television technicians is the announcement being made by *Argos Products Company, Inc.* of a new product known as the "Television Tube Caddy".

Because of the necessity for carrying a considerable number of tubes on servicing calls, the safe transportation of such tubes has become a problem to most TV technicians. The new "Caddy" has drawers which automatically classify the tubes by sizes, each tube type number being clearly visible. Removable partitions permit up to 221 tubes to be carried or allows the additional space to be used for carrying tubes not in cartons or small tools. A special compartment, designed to accommodate twenty-two 3AG fuse boxes, is also provided. Clips on the cover permit the carrying of current price lists

Five new RCA-equipped stations in Mexico, Brazil, and Cuba, add television to the forces which make Good Neighbors of all the Americas.

Now television goes "Good Neighbor"

As little as 10 short years ago, television—to the average man on the street—seemed far away. Today, television is in 10,500,000 homes.

Newest demonstration of TV's growth is its leap to Latin America. Three RCA-equipped stations are now in Cuba, one in Mexico, another in Brazil—and more are planned. They are contributing to television progress by following a single telecasting standard. They also use developments from RCA Laboratories: the image orthicon television camera, electron tubes, monitoring equipment, and antennas.

And as our neighbors to the south watch television at home, they see another development of RCA research—the kinescope. It is the face of this tube which acts as the "screen" in all-electronic home TV receivers . . . on which one sees sharp, clear pictures in motion.

See the latest wonders of radio, television, and electronics at RCA Exhibition Hall, 36 West 49th St., N. Y. Admission is free. Radio Corporation of America, RCA Building, Radio City, New York 20, New York.

Results of RCA Research are seen in the magnificent pictures produced on the screens of the new 1951 RCA Victor home television receivers.

RCA

RADIO CORPORATION of AMERICA

World Leader in Radio — First in Television

UNIVERSAL MICROPHONES

"Better Than Ever"

• ANOTHER UNIVERSAL STAR!

MODEL 312 Crystal...High Output-56 db. Response: 40 to 9000cps - Finish: Satin Chrome

● Quality Features: Newly designed moisture proof cartridge with "permaseal" construction insures uniform performance against varying humidity. The slight rising characteristic of Model 312 gives smooth response for clear-crisp speech and clear-tone music.

Recommended for home recording on disc or tape, public address, orchestras, musical groups and amateur.

Moderately Priced! Guaranteed by Universal!

WRITE FOR LATEST CATALOG.

UNIVERSAL *Microphone* COMPANY

705 IVY STREET • GLENDALE 4, CALIFORNIA

LEARN

Television -Radio OR Electricity

IN THE GREAT SHOPS OF COYNE

COYNE 52nd YEAR

TRAIN QUICKLY!
OLDEST, BEST EQUIPPED SCHOOL of ITS KIND in U.S.
Young and Older Men

Come to the Great Shops of Coyne in Chicago. Get practical training in TELEVISION-RADIO or ELECTRICITY — vital in Defense Program. Prepare now for a better job or better service rating.

START NOW—PAY LATER

You can finance most of your tuition, pay for it later in easy monthly payments. **Special plan for men of Draft Age.** Part time employment service available.

GI APPROVED

FREE BOOK Clip coupon for Big Free Illustrated Book. Indicate below, course that interests you. No salesman will call. Act NOW.

An Institution not for Profit

B. W. COOKE, Pres.
COYNE Electrical & Television-Radio School.
500 S. Paulina St., Chicago 12, Ill. Dept. 41-85H

Send FREE BOOK and full details on:

☐ TELEVISION-RADIO ☐ ELECTRICITY

NAME.....

ADDRESS.....

CITY STATE

SPECIAL: MICA CONDENSERS!! . . 150 MMFD, ½ post. stamp. Pigtail leads. 100/$4.75; 1M/$32.50
MOULDED BAKELITE CONDENSERS (Micamold) .00001 to .2 mfd, 200-600V. Kit of 50 asstd. . $1.98

Leotone

INPUT TRANSFORMER (GE) . . 3-8 ohm pri. to grid. For Intercoms, mag. P.U., Dyn. mikes. 1½x2x1¾ $1.49

GRILLE CLOTH . . Ivory, Tan or Brown. 10" sq. . . 19c
W-1108 FIELD WIRE . . rolls 100-400 ft. ONLY ½c ft.
OIL CONDENSERS . . 4MFD—600V . . upright mtg. 59c
Dual .1 MFD-600V BATHTUB . . assbly of 8 for $1.49
.25 MFD.-400V. bathtub. . . . . 29c; 4/$1.00
RADIO HARDWARE TREASURE . . FULL POUND CAN of Screws, Nuts, Washers, Lugs, etc. . . 69c; 3/$1.98
"POLYSTYRENE" ROD & TUBING . . 12" lengths . .
ROD:
¼"—9c; ⅜"—19c; ½"—34c; ⅝"—53c; ¾"—78c
TUBING:
¼"—9c; ⅜"—12c; ½"—16c; ¾"—25c; 1"—34c
6V. HI-FREQUENCY BUZZER . . fully adjust. . . 69c
TELEGRAPH KEY & 6V. BUZZER. ¼" bakelite. . $1.49
CABINET DRAW SLIDES. Ball-bearing . . 13" (9" ext)—$2.10; 15" (11" ext)—$2.25; 16½" (12½" ext)—$2.39; Heavy Duty, all-steel, 16½"/12½" . . $3.25
CABINET LID SUPPORTS for CONSOLES, CHESTS. Spring action, self-holding to 70°. . . . . 49c; 6/$2.49
hi-FIDELITY CRYSTAL MIKE . . Rubber Shock-mtd. Hi-imped. O.D. 1⅜"x1¼" . Less housing. $1.29
ALUMINUM HOUSING for crystal mike. 15
2½" SQ. PANEL METERS . 0-9V. DC. 1.29
0-100 AMP. DC & SHUNT. 98
MERCURY SWITCH . . 1A/115V 39c; 3/ 1.00
DPDT TOGGLES (6A/125V) Split ball. . 39c; 3/ 1.00
2.5 MH R.F. CHOKES . . 125ma Fl-wound. 29
BALL BEARINGS:
O.D. ⅝". I.D. ⅛" 23c; 5/ 1.00
O.D. ¾". I.D. 3/16" 29c; 4/ 1.00
BROWN BAKELITE PANELS (1/16") Glossy:
7"x10"—39c; 7"x14"—49c; 7"x18"—59c; 9"x15"—65c
POWERFUL "ALNICO MAGNETS" "U" TYPE for TAPE or WIRE ERASE, TV. MOTORS. ¾"x9/16" sq. 39c; 15/$5.00
ALNICO MAGNET KIT . . assment of Bar, Block, "U," Ring. Kit of 10 magnets. $1.98
(WRITE FOR "ALNICO MAGNET" SUPPLEMENT)
TUBE CLAMPS . . Bircher-type, 1-3/16" or 1 5/16. 8c; 100/$6.50
4¾" SHAFT EXTENSION . . ¼" to ¼" 35c
DYNAMIC HEADSET & HAND MIKE (MH1-H19). . 2.49
TELESCOPING WHIP ANTENNA . . 57" CHROMED 1.49
LUMINOUS TAPE . . "GLOWS IN DARK." 100 ft. x ¾" 49
18 FT. WHIP ANTENNA . . 6 steel screw sects 2.49
MS-53 MAST SECTIONS to extend 18 ft. whip. . .39
#28 SCE MAGNET WIRE . . approx. 500 ft. . .29
#30 P.E. MAGNET WIRE . . approx. 400 ft. . .29
BARGAIN KITS!! . . KNOBS . . 25 asstd. 98
MICA PADDERS—TRIMMERS . . Kit of 15 asstd. .69
ROTARY SELECTOR SWITCHES . . Kit of 6 asstd. 1.75
WAFER SOCKETS . . 4 to 8 pin. 12 asstd. 25
DIAL WINDOWS . . glass, acetate. 12 asstd. . . 1.29
DIAL SCALES . . incl. FM & AM. 25 asstd. 2.49
DIAL ESCUTCHEONS . . Rnd, slide-rule. 25 asst. 2.49
VOLUME CONTROLS . . Less sw. 6 asstd. . . . 1.49
RESISTORS . . carbon, w.w. ferrule, 25 asstd. . .79
EXPERIMENTAL TUBES for Test, Research. Fil. tested. 20 asstd. recvg. types. 1.00

"FACTORY SPEAKER REPAIRS SINCE 1927"

Min. order $3.00. 20% deposit req. on all COD's. Full remittance with foreign orders. Please add sufficient postage—excess refunded.

LEOTONE RADIO CO.
65 Day Street
New York 7, N.Y.

or inventory sheets. The unit is constructed of plywood with leatherette covering.

Jobbers will handle this item and

full details may be obtained from them or from the company at 4753 N. Broadway, Chicago 40, Ill.

"SUPER-TRACER"

Precision Electronics, Inc. of 641-643 Milwaukee Avenue, Chicago 22, Illinois has introduced a new deluxe signal tracer which is designed to speed television and FM servicing.

The "Super-Tracer" features high gain, low input capacity, and a frequency range coverage from 20 cycles to over 300 mc. The instrument is isolated from the a.c. line so that it may be used to check both a.c. and d.c. sets. A large 5" speaker checks for 60 and 120 cycle hum. The probe, which is furnished with the unit, has a polystyrene tip, an aluminum barrel, and measures 6" x ⅞" in diameter.

A data sheet giving full specifications on the Model 201A signal tracer is available from the company on request.

STAMPED TV TUNER

The *Franklin Airloop Corporation* of 43-20 34th Street, Long Island City 1, New York has recently developed a new television station selector having an intermediate frequency output of 41.25 to 45.75 mc.

The tuner is of the rotary switch type employing inductances for each of the twelve channels. Inductance and wiring are die stamped on low-loss bakelite wafers. Tuned circuits are employed in the input, r.f., oscillator, and mixer circuits. The r.f. stage uses a 6BC5 tube while the mixer and oscillator use a 6J6.

Specifications and quotations are available on request.

CR TUBE REACTIVATOR

The House of Television, Inc., 40 West 4th Street, New York, New York has started delivery on a new picture tube reactivator which is said to restore the brightness to most television picture tubes ranging in size from 10 to 20 inches.

This pocket-size electronic unit plugs into any 105-115 volt, 50-60 cycle outlet and requires very little operating skill. No parts or materials are necessary to reactivate the tube. Removal of the tube from the cabinet or chassis

Here's the BOOSTER that says "YES" to all your demands...

the New AUTOBOOSTER by ITI

THE *FULLY AUTOMATIC* TV-FM BOOSTER

Here at last is a TV Booster that gives you gain up to nine times, full band width for undistorted video and audio on all channels, plus — the newest development in booster design — completely automatic operation.

The ITI AUTOBOOSTER turns itself on and off and is automatically tuned by the normal operation of the TV receiver. No confusing array of knobs — no unsightly mess of wires — You can install the ITI AUTOBOOSTER in the back of the receiver, out of sight. You get all the improved performance, all the fine picture quality that this precision-engineered booster can give you with none of the trouble of tuning, none of the exposed wiring usually involved in booster operation.

Customer acceptance is assured, too, because no customer instruction is needed. After it's installed, all you can see is the improved picture.

- ✓ AUTOMATIC ON-OFF
- ✓ AUTOMATIC TUNING
- ✓ CONCEALED INSTALLATION
- ✓ SINGLE OR DUAL INPUT
- ✓ HIGH UNIFORM GAIN

BUY THE BOOSTER THAT SAYS "YES" to all your PROBLEMS

WRITE FOR SPECIFICATION SHEET

ORDER AUTOBOOSTER FROM YOUR JOBBER TODAY!

LIST $44.95 F. O. B. CLIFTON, N. J.

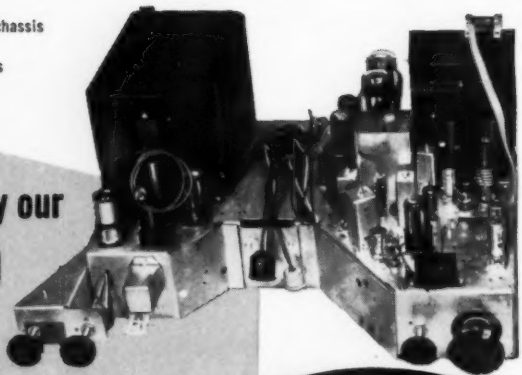
BOOSTER CHECK LIST

AUTOBOOSTER	A	OTHER BOOSTERS TESTED B	C	D	E	F
Automatic On-Off	YES	YES	NO	NO	NO	NO
Automatic Tuning	YES	NO	NO	NO	NO	NO
Concealed Installation	YES	NO	NO	NO	NO	NO
Full Bandwidth (All Channels)	YES	NO	YES	YES	NO	YES	NO
Amplifies FM Band	YES	YES	NO	NO	YES	NO	NO
Single or Dual Input	YES	NO	NO	NO	NO	NO	NO
Gain 19db on Low Channels 2 - 6 FM	YES	NO	NO	NO	NO	NO	NO
Gain 14 db on High Channels 7 - 13	YES	NO	NO	NO	NO	NO	YES
Made by a TV Receiver Manufacturer	YES	NO	NO	NO	NO	NO	NO

THE ONLY TV BOOSTER DESIGNED AND MADE BY A TV RECEIVER MANUFACTURER

INDUSTRIAL TELEVISION, INC.

Not a kit, but a complete chassis assembled and checked by professional experts



14 reasons why our RCA type 630 chassis is your best TV buy!

1. 30 tubes—27 tubes, 3 rectifiers
2. AFC horizontal hold, featuring Syncrolok
3. High voltage doubler circuit
4. Maximum brilliance with any picture size up to 19"
5. Co-channel sound, featuring good limiting for maximum noise immunity
6. Keyed AGC (using extra 6AU6 tubes), minimizes airplane flutter, keeps picture level constant and uniform when switching from channel to channel
7. Overall band width four m. c. for maximum definition and picture crispness
8. Original 630 sync chain for maximum picture stability
9. Molded condensors throughout
10. Full complement of electrolytics as specified in original design
11. Focus coil and yoke assembly with removable plugs for easy servicing
12. Top quality video amplification assuring good contrast range for full "blacks and white"
13. Same chassis used in highest-priced sets and custom installations
14. Complete with mounting hardware ready for installation

Contact us immediately for low price of this unbelievable buy!

manufactured by
TRAD TELEVISION CORP.

Tradtel sold by DISTRIBUTORS, INC.
a division of TRAD TELEVISION CORP.

Dept. N-4, 1001 First Avenue Asbury Park, New Jersey
Asbury Park 2-7447. In New York, WOrth 4-1197

"A CUTIE"
0-1 MA. Meter. Total size only 1¾" Diameter. Flush mounting — Aluminum case. Ideal for limited space.
ONLY $4.95 each

PEAK ELECTRONICS COMPANY

188 Washington St., New York 7, N. Y.
Phone COrtland 7-6443, 7-6486

SIGMA SENSITIVE RELAY
S.P.D.T. adjustable from 700 Microamps to 1.5 MA, 8000 ohm coil...$2.75 ea.

PANEL METERS

GE—General Electric
WH—Westinghouse
W—Weston S—Simpson
SU—Sun *—Special Sale
S—Square Case

2" Meters

0-100 UA, GE			$6.95
0-5 MA, S, SQ*			2.95
0-5 MA, GE*			2.45
0-20 MA, S*			1.95
0-25 MA, SU*			1.95
0-50 MA, SU*, SQ			1.95
0-1 AMP RF, GE			2.95
0-2 AMP RF, S, SQ			2.95
0-4 AMP RF, GE			2.95
0-9 AMP RF, W			2.95
0-30 AMP DC, GE			2.95

3" Meters

0-150 VAC, GE, SQ			$7.95
0-5 KVDC, S			9.95
0-2 MA, S			4.50
0-5 MA, GE, SQ			3.95
0-20 MA, WH*			2.95
0-20 MA, S			3.95
0-20 MA, GE, SQ			3.95
0-30 VOLT DC, DA			2.75
0-200 MA, GE			4.50
0-15 KV DC, GE SQ. (500 UA Movement) with 30 Meg 1% Multiplier			$15.75

OIL CONDENSERS

1.75 mfd	400 vdc		$0.39
6 mfd	600 vdc		.95
8 8 mfd	600 vdc		1.79
10 mfd	600 vdc		1.95
4 mfd	1000 vdc		1.95
2 mfd	2000 vdc		2.95
10 mfd	2500 vdc		5.95
2 mfd	4000 vdc		6.50
1 mfd	5000 vdc		4.50
.1/.1 mfd	7000 vdc		2.95
.1 mfd	7500 vdc		1.25
2 mfd	6000 vdc		12.95

PIGTAIL MICAS

MMF: 5, 20, 50, 60, 100, 250, 300, 400, 500, 750, 800, 1000, 2000, 3000, 4000, 5000, 6000, 10000 ..... $0.09 ea.

Ceramicons

MMF: 20, 120, 500 ..... $0.05 ea.

Silver Mica Capacitors

MMF: 10, 50, 40, 240, 750, 780, 1000. $0.12 ea.

CHOKE BARGAINS

6 Hy.	400 MA, C		$3.95
6 Hy.	250 MA, C		2.95
5 Hy.	170 MA, C		1.75
6 Hy.	50 MA, C		.49
6 Hy.	175 MA, C		1.95

PANEL METER KIT

Here's what you get:
- 2" Sq. bakelite cased meter, Gov't. Surplus
- Scales for all the following ranges: 0-50 ma, 0-100 ma, 0-200 ma, 0-500 ma.
- Pre-calculated shunt sizes for all ranges.
- Complete instructions.

Only $2.50 ea.; 3 for $6.75

WESTON METERS 4" SQ. 1% ACC

0-300 VAC		$8.95
0-1½ AMP DC		7.95
0-2 AMP DC		7.95
0-500 MA DC		7.95
0-12 KV DC		9.95
0-20 Volts DC		6.95
0-15 AMP RF		8.95

HIGH CURRENT MICAS

Tolerance 5%.

CAP MFD	Amps. 1 Mc	KV DC	Price Each
.00024	TYPE G3 4	6	$4.95
.0006	10	20	$19.50
.0008	12	20	19.50
	TYPE G5		
.0001	6	35	$32.50
.00015	10	35	37.50
.0005	20	35	42.00
	TYPE G4		
.08	60	4	$27.50
.02	40	9	29.50

1% W. W. Resistors

Ohms: 2K, 5K, 8500, 50K, 100K ..... $0.45 ea.

Non-Inductive Resistors

Ohms: 250, 500, 12,500
100 watts $0.75

RAYTHEON SWINGING CHOKE

2 to 12 Henrys, 1 Amp to 100 Ma. 15 Ohms DC fully cased. High voltage insulation, ceramic insulators. Very conservatively rated. Weight 60 Lbs. ..... $16.95 ea.

Meter Multipliers

1 Meg. 1/5 of 1% Cage Enclosed 1 KV...$2.95
2 Meg 1/2 of 1% Tubular 2 KV $2.95
4 Meg 1/2 of 1% Tubular 4 KV $3.95

Weston Portable AC VOLTMETER

Model 433. 0-150 Volts AC, 25 to 2400 cycles. 3½% accuracy, mirrored hand calibrated scale. Bakelite case with leather handle $27.50

BAKELITE CASED MICAS

MFD	VDC	Price	MFD	VDC	Price	MFD	VDC	Price
.001	600	$ .18	.024	1500	$ .65	.00045	5 KV	$1.10
.002	600	.24	.033	1500	.75	.001	5 KV	1.60
.01	600	.26	.02	2 KV	.90	.0015	5 KV	1.60
.02	600	.28	.002	2500	.45	.003	5 KV	1.90
.027	600	.26	.004	2500	.50	.005	5 KV	2.50
.01	1 KV	.45	.005	3 KV	1.50	.0003	8 KV	2.50
.002	1200	.35	.0001	5 KV	.70	.0005	8 KV	2.90

WIRE WOUND RESISTORS

5 watt ohms: 25-50-200-2500	$ .09 ea.
10 watt ohms: 25-40-84-400-1325-2K-4K	.15 ea.
20 watt ohms: 50-70-100-300-750-1K-1.5K 2.5K-2.7K-5K-10K-20K	.20 ea.
30 watt ohms: 100-2500-5300-18K	.22 ea.
100 watt ohms: 100-3750-1500-2K, 10K, 20K, 25K-50K, 75K	.59

GUARDIAN LATCHING RELAY

SPDT, 110 V 60 cy Coil, 15 Amp Contacts $1.95

ADJUSTABLE SLIDER RESISTORS

20 Watt: 1, 5, 50, 300 ohms	.25
50 Watt: 500 Ohms	.35
75 Watt: 100, 150, 200 Ohms	.39
100 Watt: 20, 50, 75, 100, 500 Ohms	.49

MISCELLANEOUS BARGAINS

25 ohm 67S watt Rheostat	$2.95
50 meg 3S watt Resistor	.99
250 mmf Midget Var. Ceramic Ins	.69
15 mmf Midget Var. Ceramic Ins	.39
4PST Lever Switch Mossman	.89
Ceramic RF Switch SP 11 Pos	.89
4PDT Relay, 4500 Ohm DC Coil	1.95
.02 600V Tubular	15 for .99
.05 600V Oil Tubular	12 for .99
10K, 15K Pots	4 for .99
16 mfd 450 V. Electrolytic	.39
5-20 mmf Ceramic Variable	.24
1.5—7 mmf Ceramic Variable	.24
SPST Push Button Switch	.29
5x5 MFD 400 VDC Oil	.39
1x1x1 MFD 1200 VDC	.59
100 mmf Air Paddle APC 100	.49
50 mmf Air Paddle APC 50	.39
Fil Transf. 2½V CT, 40 AMPS, 110V CY	6.95

POWER TRANSFORMERS

Fully Cased. Pri. 110 Volts 60 cy.

1110 volts CT 60 MA, 920 volts CT 160 MA, 6.3V, 18A, 6.3V, 1.25V, 5V2A, 5V2A	4.95 ea.
940 Volts CT 425 MA, 65V BIAS	7.95

is unnecessary. The reactivation process requires approximately 30 minutes.

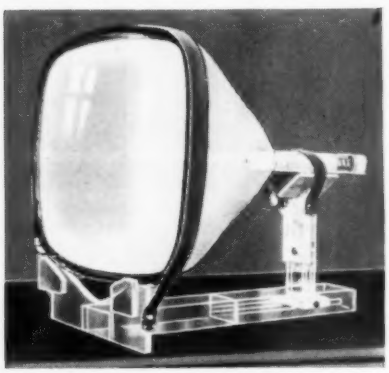
The unit is housed in a hammertone steel gray case which measures 5" wide by 5" high by 2¼" deep and weighs only 3 pounds.

Complete details on the operation of the unit, price, and other information will be supplied by the company on request.

PLASTIC TUBE HOLDER

A new item which has been designed especially for the television technician has been announced by *Precision Plastic Products, Inc.*, 628 West Lake Street, Chicago 6, Illinois.

Tradenamed the "Tube Vise", the new device safely and securely holds



any size television tube in a rigid, adjustable frame. According to the company, this holder eliminates or minimizes the danger of breakage when the tube is on the bench and speeds servicing by permitting easy access to the tube. —30—

DISASTER COMMUNICATIONS SERVICE RULES

RULES governing the Disaster Communications Service, which became effective March 21, 1951, have been issued by the FCC.

A station license for operation in the Disaster Communications Service may be granted to any person eligible for a station license under the Communications Act providing that the station is a member of a bona fide disaster net.

When there is more than one such net in any area, available frequencies must be shared under a coordinated plan.

Applications for station licenses to operate in this service shall be submitted on FCC Form No. 525, signed by the applicant and countersigned by the local authority in charge of the local disaster network.

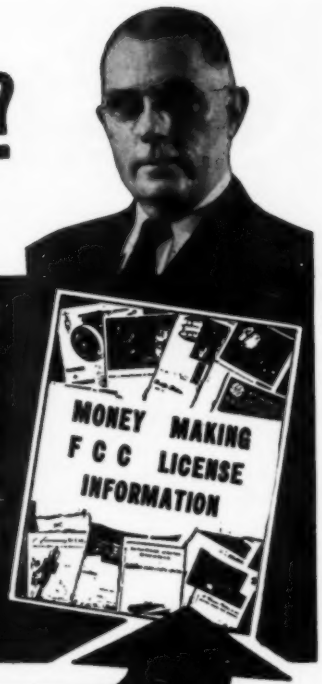
Licenses will be issued for a term of from one to five years.

Stations will be operated only in emergencies or during practice drills, and then only to handle messages in connection with the emergency.

Special call signs consisting of four letters followed by one digit will be issued for these stations.

Operators must hold either a valid amateur or commercial license. The operator's license will only be valid for the same type of operation under emergency service as the basic license limitations. For example, a radiotelephone license will only be valid for operation using A3. —30—

Want To Double Your Pay?



How To Pass FCC COMMERCIAL RADIO OPERATOR LICENSE EXAMINATIONS

GET THIS AMAZING NEW BOOKLET FREE!

TELLS HOW—

WE GUARANTEE

TO TRAIN AND COACH YOU AT HOME IN SPARE TIME UNTIL YOU GET

YOUR FCC LICENSE

If you have had any practical experience—Amateur, Army, Navy, radio repair, or experimenting.

TELLS HOW— **Employers make JOB OFFERS like These to Our Graduates Every Month!**

Telegram, August 9, 1950, from Chief Engineer, Broadcast Station, Pennsylvania, "Have job opening for one transmitter operator to start immediately, contact me at once."

Letter, August 12, 1950, from Dir. Radio Div. State Highway Patrol, "We have two vacancies in our radio Communication division. Starting pay $200; $250 after six month's satisfactory service. Will you recommend graduates of your school?"

Letter, August 24, 1950, from radio-television sales and service company, Ohio, "We are in need of a good television man. The pay will be good, also good surroundings to work in. Please let us hear from you."

Telegram, Sept. 7, 1950, from Chief Engineer, Broadcast Station, Georgia, "Have immediate opening first phone engineer. Prefer one with usable voice, experience not necessary. Prefer man from small town. Beginning pay $48 for 48 hours."

These are just a few of the examples of job offers that come to our office periodically. Some licensed radiomen filled each of these jobs; it might have been you!

HERE'S PROOF FCC LICENSES ARE OFTEN SECURED IN A FEW HOURS OF STUDY WITH OUR COACHING AT HOME IN SPARE TIME:

Name and Address	License	Lessons
Lee Worthy, 2210½ Wilshire St., Bakersfield, Calif.	2nd Phone	16
Clifford E. Vest, Box 1016, Dania, Fla.	1st Phone	20
Francis X. Foerch, 38 Beucler Pl., Bergenfield, N. J.	1st Phone	38
S/Sgt. Ben H. Davis 317 North Roosevelt, Lebanon, Ill.	1st Phone	28
Albert Schoell, 110 West 11th St., Escondido, Calif.	2nd Phone	23

TELLS HOW—

Our Amazingly Effective JOB–FINDING SERVICE Helps CIRE Students Get Better Jobs

Here are a few recent examples of Job-Finding results:

GETS JOB WITH CAA

"I have had a half dozen or so offers since I mailed some fifty of the two hundred employment applications your school forwarded me. I accepted a position with the Civil Aeronautics Administration as a Maintenance Technician. Thank you very much for the fine cooperation and help your organization has given me in finding a job in the radio field."

Dale E. Young, 122 Robbins St., Owosso, Mich.

GETS FIVE JOB-OFFERS FROM BROADCAST STATIONS

"Your 'Chief Engineer's Bulletin' is a grand way of obtaining employment for your graduates who have obtained their 1st class license. Since my name has been on the list I have received calls or letters from five stations in the southern states, and am now employed as Transmitter Engineer at WMMT."

Elmer Powell, Box 274, Sparta, Tenn.

OURS IS THE ONLY HOME STUDY COURSE WHICH SUPPLIES FCC-TYPE EXAMINATIONS WITH ALL LESSONS AND FINAL TESTS.

GETS CIVIL SERVICE JOB

"I have obtained a position at Wright-Patterson Air Force Base, Dayton, Ohio, as Junior Electronic Equipment Repairman. The Employment Application you prepared for me had a lot to do with me landing this desirable position."

Charles E. Loomis, 4516 Genesee Ave., Dayton, Ohio.

Your FCC Ticket is always recognized in all radio fields as proof of your technical ability.

Get All 3 FREE

CLEVELAND INSTITUTE OF RADIO ELECTRONICS
Desk RN-28—4900 Euclid Bldg.
Cleveland 3, Ohio
(Address to Desk No. to avoid delay.)

I want to know how I can get my FCC ticket in a minimum of time. Send me your FREE booklet, "How to Pass FCC License Examinations" (does not cover exams for Amateur License), as well as a sample FCC-type exam and the amazing new booklet, "Money-Making FCC License Information."

Name .....

Address .....

City ..... Zone ..... State .....

Paste on penny postcard or send air mail.

OLSON AKRAD

Olson Radio Warehouse, Inc.

73 E. Mill St. • Akron 8, Ohio

FREE—SEND FOR OUR LATEST RADIO AND TELEVISION BARGAIN CATALOG

PHILCO 1951 AUTO RADIO

THE ONLY UNIVERSAL ONE-PIECE AUTO RADIO FOR ALL CARS

FITS ANY CAR OLD OR NEW

OLSON'S GREAT VALUE!

A brand new Philco 6-tube super-het auto set with 30% more undistorted sound output for rich, clear-voiced volume and greater range. New 3-gang permeability tuner. Built-in interference filtering.

New streamlined design, with slide-rule dial encased in gleaming chrome finish to harmonize with modern cars. Rugged, compact steel case finished in dark blue hammertype lacquer, has sloping front—neat, attractive, space-saving—out of passengers' way. Installed in a few minutes beneath the instrument panel of the car. Controls are easy to reach and tune . . . yet set is out of the way and virtually out of sight like a built-in part of the car. Complete with tubes, mounting bracket, generator condenser and distributor suppressor. Size: 5¾" x 5⅜" x 7¼". Shpg. wt. 20 lbs.

Model CR-501

$34.37

TV INSTALLATION MEN

If you install TV Antennas, Olson wants you to take advantage of this terrific Antenna Value. High gain Stacked Conical Array with high frequency stubs. Ideal for "Fringe" Area Reception. Sturdily constructed, elements are aluminum. Easily assembled.

This Is a Terrific Value! Each Antenna consists of two conical bays plus a pair of matching Q bars. Less mast. Packed—3 Antennas to a carton. This gives you six bays and 3 pairs of Q bars.

Sold Only in Boxes of 3 Antennas

AU-66. In lots of 3, each..... **$8.66**

Carton of 3..... **$25.98**

Weight 25 lbs.

TV BOOSTER KIT RA-26 **$9.95** Complete

Build your own TV-FM booster. Improves reception on low-signal, "fringe" areas. 3 to 5 db gain in signal to noise ratio. All channel tuning. Complete with 6AK5 tube, pre-aligned coils, etc. Shpg. wt. 5 lbs.

TV COMPONENTS

Deflection Yoke for use with 10BP4, 12LP4, 16AP4 and all similar kinescopes, same RCA 201D1 WT. 2 #. **T-85, Olson's Price, only..... $3.59**

Deflection Yoke for use with kinescopes requiring 70 degree magnetic deflection such as Rectangular 14BP4, 14CP4, 16RP4, 16TP4, 16KP4 and round 16GP4. WT. 2 #. **T-86, Olson's Price, only..... $4.49**

$3.99 Hi-Voltage Flyback output transformer for 10" & 12" kinescopes. Provides 9KV. Same as RCA 211T1. WT. 4 #. **T-82, Olson's Price, only..... $3.99**

300-Ohm Lead-in **$4.00** High grade, low loss. For all TV installations. Ship. wt. 3 lbs. **W-48.** 100 ft. coil.

FAIRCHILD GRINDER

TL-3 **$9.98** each

Every service shop needs one of these handy tools made by Fairchild, famous manufacturer of precision electric grinders. Regular nationally advertised price is $19.75. The set consists of 1—115 volt high speed, air cooled grinder, 6 assorted grinding wheels, 1 circular saw blade, 1 hardened steel reamer, 1 buffing brush, 1 abrasion stone and a natural finish wood case size 10"x5"x 3" to house the grinder. Shipped in original factory sealed cartons.

AKRAD TUBULAR ELECTROLYTICS

Packed 10 of a size to a box. Order 10 of a size.

Stock No.	Cap.	W.V.	Each
C-136	10	25	$0.25
C-137	25	25	.30
C-138	20	150	.39
C-139	40	150	.45
C-140	20-20	150	.59
C-200	50-30	150	.69
C-141	8	450	.39
C-211	8-8	450	.69
C-142	16	450	.57
C-197	20	450	.69
C-198	30	450	.79
C-199	40	450	.89

Olson "Akrad" Condensers are becoming more widely used by radio servicemen everywhere—and for a good reason! They're made to take hefty surges and overloads and pack a mighty wallop. They cost so little, too! Every "Akrad" condenser is backed by Olson's famous Satisfaction or Your Money Back Guarantee! Always get "Akrad." Compact size with superior characteristics. Easily mounted. Sealed aluminum inner tubes insure maximum life. Tinned copper leads. Give long, trouble-free service.

AUTO RADIO ANTENNAS

RUSTPROOF BRASS TUBING! INSTANTLY ADJUSTED! Triple Chrome Plated Highest Quality Insulators. **SIDE COWL MOUNT** 3 section; extends to 66". Includes low loss lead-in cable. **AU-1** **$1.99**

TRIPLE CHROME PLATED HIGHEST QUALITY INSULATORS! TOP COWL MOUNT 3 section; extends to 54". Includes low loss lead-in cable. **AU-8** **$2.99**

RCA "FIRE GLOW" FLUORESCENT SIGN

$8.95

Bigger, brighter, and whiter. The new RCA Fire Glow has high daytime visibility and brilliant luminous white glow at night. The plastic face is three-dimensional, cased in steel. Sign stands on rubber protectors, or can be hung from ceiling with chain supplied. 110 Volt, 60-cycle AC operation. Complete with fluorescent lamp. Shpg. Wt. 15 lbs. **$8.95**

ZF-985

CLOSE-OUT ENTIRE STOCK!

CORNELL-DUBILIER CONDENSERS

Save big money during Olson's big C-D close-out sale. Over 35,000 brand new shiny electrolytic condensers will be purchased by Olson's customers. Be sure of getting your share. Order early.

Stock No.	Fig.	Capacity	Volts	Close-out Price
C-530	A	8	450	$0.59
C-510	B	15	300	.29
C-501	B	10-10-20	450-450-25	.39
C-517	B	20-10-10-10	450-450-450-450	.99
C-502	C	32	350	.39

Cornell-Dubilier Paper Filter Block

Hard to get, but Olson has these 4 MFD 400 volt tough condensers. Not Electrolytic. Dry construction throughout. Size 3¼"x2"x1". Reg. list price $2.95. **49c**

C-523 Olson's Price, each.....

PHONOGRAPH RECORDS

"TIME TO SLEEP." A 12", 78 RPM, unbreakable disc in album form recorded by World Famous magician Ralph Slater. Designed to put anyone to sleep. Save money. Thousands sold at $3.75. Shpg. wt. 3 lbs. **$1.29**

X-242, your cost, per album only.

AM-FM RADIO CHASSIS

IT'S A BEAUTY

COMES TO YOU WITH EIGHT TUBES

Stock No. RA-52

$49.95 each

Olson's Great Bargain of the Year

It's new! Never offered before by any jobber! A high quality, high-fidelity radio that you will be proud to own. You'd expect to pay more but Olson made a remarkable deal with the manufacturer. When present stock is gone, there will be no more. This receiver can be used in combinations selling from $350.00 to $500.00. It's a perfect unit for custom building into cabinets, shelves, etc.

This amazing set is equipped to receive standard broadcasts from 540 to 1650 KC and FM reception from 87.5 to 108.5 mc. Two dual controls are provided for simplicity of operation.

Phono connection on rear of chassis. Wide vision, easy to read dial. This radio cannot be beat for quality and precision.

Any PM speaker can be used with this set. Choose one from this flyer. Set is supplied with 8 tubes: 1—12AT7, 1—6BE6, 2—6BA6, 1—6AL5, 1—6AV6, 1—6V6GT, 1—5Y3GT, less speaker. Individually packed in factory-sealed cartons. Chassis size 13⅛"x7¼"x8⅞".

12" CO-AXIAL SPEAKER

Woofer-Tweeter design. Response 40 to 17,500 CPS

AN OLSON VALUE

$12.95

S-122

ORDER NOW!

Months of research went into the design of these high efficiency speakers. The 12" woofer section is driven by a heavy Alnico 5 6.8 oz. magnet and this part delivers the bass notes. The 3" tweeter which is built into the center of the speaker is driven by a 2.15 oz. Alnico 5 magnet and delivers the treble notes. The high pass filter is built into the speaker and the entire combination gives you tone you never dreamed possible. There are only two wires to connect to any radio or amplifier and the speaker is ready to play for you. Voice coil impedance is 8 ohms. This high quality speaker should not be confused with inferior makeshift units. Olson sells these speakers on an ironclad money-back guarantee if you are not 100% satisfied. Order today. Shpg. wt. 8 lbs.

3-SPEED PHONOGRAPH

Special **$19.97** RA-56

Plays 78-45-33⅓ RPM Discs

Complete

Finest components in the manufacture of these gorgeously designed phonographs. Features include: 3 speed Alliance motor, heavy flocked turntable, 5-volt output tone arm with precision-tip needle, volume control, 2 tube built-in amplifier, Alnico 5 PM speaker, leatherette covered case with rounded corners, convenient carrying handle. Order early and order enough. Every phonograph 100% guaranteed. Original factory-sealed cartons. Operates 115 volts AC. Shpg. wt. 15 lbs.

OLSON'S GIGANTIC NEW AKRAD KIT —WITH 4-DRAWER STEEL CABINET FREE

Reg. List Price $18.38.

AS-36. Olson's Special Price **$6.95**

We have a limited quantity of Olson Akrad "Super Sealed" by-pass condensers available in 4 drawer steel cabinets, size 61¼x33¾x81. Drawers have compartments. Condensers are designed to give long dependable service even in the tropics.

Kit Contains 42 Condensers

You get the 4 drawer steel cabinet and the following 42 Olson Akrad "Super Sealed" by-pass condensers.

Qty.	Cap.	Volts	Qty.	Cap.	Volts
2	.001	600	10	.05	600
2	.002	600	10	.1	600
2	.005	600	2	.005	1600
3	.01	600	2	.008	1600
5	.02	600	2	.01	1600

ASTATIC PROFESSIONAL

Has all advantages of low pressure design. For Broadcast and Recording Studio use. Ball bearing swivel base, accurately counter balanced arm for one ounce needle pressure. Plays up to 16" discs. Astatics Model No. HP-16. Overall length 15 in. Equipped with Astatic LP-21 cartridge and precious tipped stylus. Regular list price $25.00.

Stock No. M-72, each.... **$5.95**

OUTPUT TRANSFORMERS

T-87 **99¢** UNIVERSAL OUTPUT TRANSFORMER—Matches any single tube to any 3.2 ohm voice coil. Primary tapped at 2,000, 7,000, 10,000 ohms. 2 inch mounting centers. List Price $2.50.

T-21	Matches single 50L6, 35L6, 35A5, 25L6, to voice coil; 2000 ohms pri., 2" mtg. ctr.	69c
T-57	Matches single 6V6 to voice coil, 2½" mtg. ctr.	69c
T-58	Matches push-pull 6V6's, to voice coil, 2½" mtg. ctr.	79c
T-59	Matches single 6F6 to voice coil, 2½" mtg ctr.	69c
T-60	Matches push-pull 6F6's to voice coil, 2½" mtg. ctr.	79c

OLSON AKRAD CRYSTAL CARTRIDGES

3-VOLT OUTPUT

The crystal phono cartridge you've been waiting for—and at a price which enables you to use them in your service work profitably. The new Olson Akrad cartridge is interchangeable with any standard cartridge since the mounting centers are ½". Its high output, 3 volts and wide range response of 50-6000 cps are obtained by advanced methods used in driving the crystal element. The cartridge is supplied with pin plug connectors for ease of connecting leads. Each cartridge is individually packed in a handsome red, white, and blue shelf carton. Order some of each model today.

XC-50, Standard crystal Cartridge, each..... **$1.99**

XC-51, 3-way cartridge with built-in 2 mil needle for 33⅓, 45 and 78 RPM Discs, each..... **$2.79**

10-WATT RESISTOR KIT

RK-2 **$4.95**

All wire wound resistors, 10 watt, fully insulated. Long leads. You get 20 resistors ranging from 25 ohms to 25,000 ohms.

GIANT COMBINATION DEAL
$10 Worth of RCA Records and Phonograph

$19.97 RA-60

Compact beautifully performing phonograph for all 78 RPM records. Amplifier employs 2 tubes, 50-L-6 and 35-Z-5. Only the finest components are used, such as Alliance Rim-Drive Motor, Astatic Phono arm with L-82 cartridge, PM speaker, full range volume control, etc. The case is decorated with colorful circus figures. Operates on 115v. AC. Weight 11 lbs.

RCA VICTOR NON-BREAKABLE RECORDS INCLUDED. Yes, with the phonograph you get approximately $10.00 worth of RCA Victor non-breakable discs for children. Titles include "Happy the Humbug," "The 500 Hats of Bartholomew Cubbins," "Rapunzel," "Aladdin and His Lamp," etc. Discs are enclosed in beautifully illustrated colored folders giving each story so that the child can follow the recording. Quantity Limited—ORDER NOW!

OLSON AKRAD
THE HOUSE OF RADIO AND TELEVISION BARGAINS

BUY ALL YOUR RECORDING NEEDS FROM OLSON

STEEL RECORDING WIRE

For all standard wire recorders. Frequency response is excellent. Stainless steel wire.

X-165 ½ hr. spool..... **$1.98**
X-166 1 hr. spool...... **$2.98**

Tape

Fine magnetic recording tape. Frequency response, 50 to 8,600 cycles at 7½" per second. Uniformly coated with red oxide. Available in paper base and plastic base which is stronger. Order your recording tape from Olson. Get the best for less.

Stock No.	Size	Type	Olson's Price, ea.
X-203	¼"x 600 ft.	Paper	$1.35
X-204	¼"x 600 ft.	Plastic	2.10
X-205	¼"x1200 ft.	Paper	2.10
X-206	¼"x1200 ft.	Plastic	3.30

FP CONDENSER KIT

OLSON'S Bargain AS-24, each **$3.98**

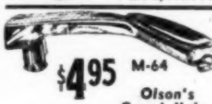
Assortment of 15 popular FP condensers, double and triple sections. Capacities from 10 mfd to 50 mfd: from 25 to 450 volts. Shpg. wt. 3 lbs.

BATTERY CHARGER

4 Amps Olson's Price RA-55 **$8.50**

Highly efficient storage battery charger. Automatically decreases charging rate as battery becomes charged. Housed in sturdy steel case with 117 volt AC cord, plug and battery leads with heavy-duty clips.

ASTATIC "TURNOVER" PICK-UP ARM



$4.95 M-64 Olson's Great Value

Cartridge turns by means of knob on front. One side plays 33⅓ and 45 RPM records and other side plays 78 RPM. Only 8 grams needle pressure. Employs the famous ASTATIC LQD-1 Double needle cartridge. Die cast curved arm. Equipped with 2 long life needles. Frequency response 50-7000 cps output 1.2 volts. Shpg. wt. 2 lbs. Reg. list price **$15.00**.

Build a Receiver Set of Basic Components

Kit of 5 parts... AS-38 **$1.89**
You get this kit of 5 basic parts to build an AC-DC set or portable:

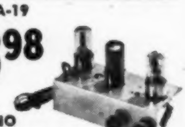
Parts	Reg. List Price
Loop	$0.95
R. F. Coil	1.10
I.F. Transformer (456 KC) Input	1.60
Output	1.60
Oscillator Coil	.75
List Price of Set	6.00

Use any 365 mfd variable for tuning. Covers 535-1625 KC.

RIM DRIVE PHONO MOTORS

Famous Makes! Real bargains at these low prices. Self-starting; complete with turntable. All parts included. Shpg. wt. 4 lbs.
M-52, 78 rpm for 115 volts AC...... **$3.79**
M-63, 3-speed, 33⅓, 45 and 78 rpm..... **$5.99**

RA-19 PHONO AMPLIFIER



$3.98

Connect to phono or speaker or just the thing for a portable. Uses: 12SQ7, 50L6, 35Z5 tubes. 2 controls: on/off volume and tone. 7"x3¼"x2". Shpg. wt. 2 lbs.
TUBES FOR ABOVE SET. AS-22........ **$2.64**

RCA 8" PM SPEAKER

S-123 **$3.99** EACH

Known as the RCA "Mighty 8." Delivers tremendous volume because of advanced engineering design and super-size Alnico 5 magnet. For radio and PA use. Voice coil 3.2 ohms. Shpg. wt. 6 lbs.

GENUINE ASTATIC PICK-UP ARM

With crystal cartridge ... at less than you'd normally pay for the cartridge alone.
OLSON'S SPECIAL M-58.. **$2.99**

MUSICAL INSTRUMENT MIKE

Famous quality! Sells for twice our sale price. Easily attached. Delivers brilliant tone from string instruments. With 4' shielded cable and volume control.
M-61 .... **$6.95**

ASTATIC MICROPHONE

High output crystal mike for PA systems and recorders. Equipped with handle base and 7' shielded cable. Shpg. wt.—5 lb.
M-67, each **$5.95**
M-66, same but with on-off switch built into handle..... **$6.95**

NEW CRYSTAL MIKE

Olson's Special **$4.29** M-71

Nationally famous make. Smart New Design, easy to hold. Used in many tape, wire and disc recorders. Can be used on P. A. systems, amplifiers, etc.

HOOK-UP WIRE KIT

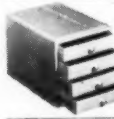
How can we give you so much high grade wire for so little? Olson bought all the wire in sight and is passing the bargain on to you. Kit contains 5 rolls, each 100 ft.—total 500 ft. Various colors, push back, plastic and rubber insulation: solid and stranded copper. Shpg. wt. 3 lbs.
AS19, 500 feet **$4.95**

4 Prong Universal VIBRATORS

Stock No. VB48 **$1.49**

The most popular vibrator in use today. Replaces Mallory 294, 859, 901M. Radiart 5300, 5301. Size 1½" dia. by 2⅞" high. Reg. list price **$4.10**. Brand new, individually boxed. Shpg. wt. 8 oz.

4-DRAWER STEEL CHEST



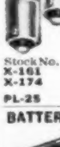
$2.19 X-199

For small parts, etc. Knob on each drawer: various size compartments. Each drawer 1¼" deep. Size: 6¼" H., 5¾" W., 8⅛" D. Shipping weight 5 lbs.

KIT OF THREE VARIABLE CONDENSERS

A $3.50 value. Perfect for the experimenter. Brand new stock. Quantity limited. Get a kit containing 3 assorted variable condensers. Popular values. 2-gang and 3-gang. Some have trimmers, vernier drives, AM and FM styles.
Olson's Price X-226 Carton of 3 asst. **$1.29**

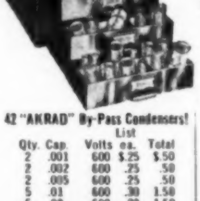
PANEL LAMPS



Westinghouse, GE, and Tung-Sol bayonet panel lamps, 100 of a type to the box.

Stock No.	Type No.	Price per 100
X-161	47	$5.59
X-174	44	
PL-25	51	$4.29

4 Drawer Steel Cabinet FREE with OLSON'S Gigantic AKRAD CONDENSER KIT



Olson's Price AS-20 **$16.95**

You get $45.20 (list) worth of "Akrad" condensers plus cabinet, 8½"x7½"x10½".

42 "AKRAD" By-Pass Condensers!

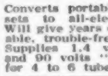
Qty.	Cap.	Volts	List ea.	Total
2	.001	600	$.25	$.50
2	.002	600	.25	.50
2	.005	600	.25	.50
5	.01	600	.30	1.50
5	.02	600	.30	1.50
10	.05	600	.40	4.00
10	.1	600	.45	4.50
2	.005	1600	.55	1.10
2	.008	1600	.55	1.10
2	.01	1600	.60	1.20

27 "AKRAD" Electrolytic Condensers

Qty.	Cap.	Volts	List ea.	Total
2	10	25	$ .75	$1.50
2	25	25	.85	1.70
5	20	150	.95	4.75
5	40	150	1.10	5.50
4	20-20	150	1.30	5.20
5	8	450	.95	4.75
4	16	450	1.35	5.40

69 Total List Value $45.20

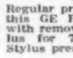
BATTERY ELIMINATOR



MODEL P **$10.95** Each

Converts portable battery sets to all-electric AC. Will give years of dependable, trouble-free service. Supplies 1.4 volts "A" and 90 volts "B" power for 4 to 6 tube sets.

GE RPX-040



XC-45 EACH **$3.49**

Variable Reluctance Cartridge with Removable Stylus

Regular price is $9.95 on this GE Phono Cartridge with removable 3 mil Stylus for 78 RPM discs. Stylus pressure ¾ oz.

IT'S EASY TO ORDER FROM OLSON'S

How to order: Order directly from this ad. For convenience use this order blank. Fill in columns below with quantity desired, stock number, description and price. You may send remittance with order (include enough for postage or parcel post shipment), or if you prefer SEND NO MONEY. Olson will ship C.O.D. and you may pay mail or expressman for merchandise and postage.

MONEY BACK GUARANTEE: *Everything you order from Olson is guaranteed as advertised. If you are not more than satisfied, you may return merchandise for cash refund.*

Please Minimum Order $3.00

QUANTITY	STOCK NUMBER	DESCRIPTION	PRICE EACH	TOTAL

NAME ________________ TOTAL
ADDRESS ________________ ADD: POSTAGE
CITY ________ ZONE ___ STATE ___ TOTAL AMOUNT

RN.451

Cut Out and Mail to: OLSON RADIO WAREHOUSE, INC.
73 E. MILL ST. • AKRON 8, OHIO

the chicago
V.T.V.M.
ELECTRONIC MULTITESTER

A versatile new Chicago Vacuum Tube Volt Meter with more ranges and greater utility—at the lowest price in the industry!

$39.00 net

RANGES

DC VOLTS
0-5,10,50,100,500,1000,5000. Input impedance: 20 megohms (including 10 megohms in the DC probe)

AC VOLTS
0-5,10,50,100,500,1000,5000
Input impedance: 10 megohms

OHMS
0 to 1000 megohms in 6 ranges with center scale readings of 10,100,1000,10K,1Meg.,10Meg.

CAPACITANCE
50 MMF to 5000 MF in 6 ranges. Low voltage power source enables testing of electrolytic condensers.

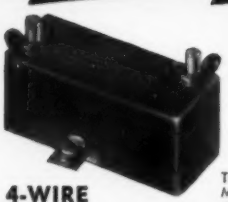
MILLIAMPERES
DC 0-1,10,100,500
(Not electronic) 50 millivolt drop.
Operates on 115 V.A.C. Dimensions: 6¾" Wide x 9¹⁵⁄₁₆" High x 6" Overall Depth

The big 5½" meter is mounted in a handsome brown Hammerloid case slanted for easy reading.

See Your Parts Distributor or Write for Complete Information

CHICAGO INDUSTRIAL INSTRUMENT CO.
536 W. ELM ST. • CHICAGO 10, ILL.

VEE-D-X *for the finest* LIGHTNING ARRESTERS *at the Lowest Prices*



New!
2-WIRE RW-200
only 1.25 LIST

The new VEE-D-X Model RW-200 is the popular low-priced arrester. Similar in design and construction to the RW-204. Two saw tooth contact points assure positive protection for any 2-wire installation.

4-WIRE RW-204
only 1.50 LIST

The first and only arrester that will accommodate 4-wire rotator line as well as regular 2-wire transmission line.

UL

The Original 2-Wire RW-300

For use with 2-wire standard transmission line. An air gap plus resistor provide double protection. RW-300 is manufactured of moisture resistant Mica-fill Bakelite. RW-300A — highest quality thermo-setting plastic.

only 2.00 LIST

LA POINTE-PLASCOMOLD CORP., WINDSOR LOCKS, CONN.

Easy, fast way to cut "Key" and "D" openings in chassis

...with new GREENLEE Radio Chassis Punches

Now, in 1½ minutes or less make perfect "Key" or "D" holes for sockets and other equipment. Simply insert GREENLEE Punch and turn with an ordinary wrench . . . get a "clean" opening in a hurry! Write today for details on these as well as GREENLEE Radio Chassis Punches for round and square openings. Greenlee Tool Co., 1884 Columbia Ave., Rockford, Illinois

No. 732 "Key" Punch

No. 733 "D" Punch

TOOLS FOR CRAFTSMEN
GREENLEE

. Spot Radio News
(Continued from page 16)

facturers could feel more sure that their war contribution would continue unabated.

HAMS will soon be obliged to operate under a new set of rules, which in the main features six classifications of licenses, instead of three: amateur extra class, advanced class, general class, conditional class, technician class, and novice class. The advanced, general and conditional classes represent the new identities for the class A, B, and C licenses. (The amateur-extra tickets will not become available until the first of the year in '52.) The advanced type license is really nothing but a different title for the class A affair, while the others all have requirement variations of one form or another from previous standards. For the complete story on the new setup see page 38 of this issue.

EDUCATION IN TV continued to be quite a topic along Commission row and particularly during on-the-road group meetings and conferences, as the hearings on this thorny issue came to a temporary halt. Madame Commissioner Hennock starred in a personal-appearance campaign for TV channels for the educators. Before a session of the Adult Educational Council of Philadelphia, she said that the teachers of our nation should have twenty-five per-cent of the channels or room for 500 stations, a move which would prove . . . "a sound investment in education and cultural development."

Describing the reasons for her firm belief in the urgent need for substantial room for the educators, the Commissioner said: "We have long been proud of our position as a pioneer nation and people. Technologically, this pioneer spirit has developed American television far ahead of the efforts of any other country. And in keeping with our traditions, the enjoyment of this great new achievement has not been limited to the rarest strata of society, to the rich and influential. In fact, TV is found today in more homes of modest and small means than it is in the homes of those who are able to afford the best of everything, including education. . . . A reservation of television channels for educational purposes will be a major factor toward strengthening our educational system and our democratic institutions. In advocating such a reservation, I believe I am advocating the preservation of our sacred American heritage."

ABOUT ONCE A YEAR, the Commission prepares a series of notes commenting on the progress achieved in the art. This year, they included what might be called a *looking-backward* section, tracing events back as far as 1912 when the Navy began using the waves in a rather intensive way and

OUTSTANDING VALUES NOW AVAILABLE

ORDER AUTO RADIO PARTS AND EQUIPMENT NOW!

AUTO ANTENNAS

TOP COWL: 3 section staff, 58" extension. Bakelite insulator, chrome trim. Single hole mount. Simple installation. Complete with lead. **$2.19** each. Case of 25.....**$1.95** each

SIDE COWL: 3 section staff, 63" extension. Complete with tenite insulators. Static ball and tip shielded. Low loss lead.

$1.89 each. Case of 25.**$1.75** each

STANDARD MANUFACTURE VIBRATORS

Standard 4 prong..... **$1.45** each.
10 for.....**$14.00**

Offset 4 prong—Delco type. **$1.55** ea.
10 for.....**$15.00**

Buick type 5 prong.....**$2.95** each.
10 for.....**$28.00**

Generator Condensers.....**25¢** each
10 for.....**$2.20**

BUFFER CONDENSERS

.005 —2000 V...
.006 —1600 V...
.0075—2000 V...
.01 —2000 V...
25¢ each
10 for **$2.25**
100 for **$19.50**

GUARANTEED RECTANGULAR PICTURE TUBES

A real bargain for these first-rate tubes.

16"—16RP4.....**$28.50** each
17"—17BP4.....**$29.95** each
20"—20CP4.....**$52.50** each

PHONO CARTRIDGES—Brand New —Will replace 95% of all cartridges.
1 volt—Standard Mounting.**$1.75** ea.
3 volt—Standard Mounting.**$1.85** ea.

GT TUBE CARTONS

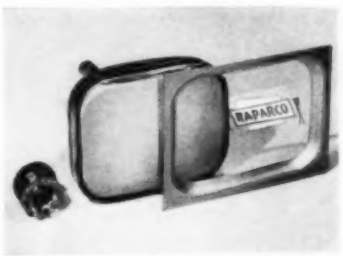
Sturdy—Many Uses

Box bulk tubes, spare parts, nuts and bolts. **79¢** per 100. **$4.95** per 1000.

CHIMNEY MOUNTS—2 piece heavy-duty, rust-proof brackets. No drilling or guy wire needed. Includes strapping. **$1.45** each 12 for **$1.30** each

NOW! LARGE 14" or 17" PICTURE FROM YOUR 10" or 12" TELEVISION SET

Servicemen: Convert customers' sets for extra profits! 90% of all conversions can be made by use of the RAPARCO conversion kit.



14" Kit—14BP4 CR tube, 70° Deflection yoke. Attractive Lucite mask. **$34.95**

17" Kit—17" Rectangular CR tube, 70° Deflection yoke. Attractive Lucite mask, 17" HV Flyback transformer.....**$39.95**

TV COMPONENTS

Standard Manufacture. All New. All Guaranteed.

16" HV Flyback transformer.....**$4.50** ea.
12½" HV Flyback transformer..... **2.95** ea.
GE type 16" to 19" Flyback transformer..... **4.50** ea.
Vertical Output transformer. **1.59** ea.
500 MMFD—20 KV. **$1.11** ea., 10 for.....**$10.00**
500 MMFD—10 KV. **79¢** ea., 10 for.....**$7.00**
Single Magnet Ion traps **49¢** ea., 10 for.....**$4.50**
Double Magnet Ion traps **79¢** ea., 10 for.....**$7.50**
.001 MFD—6 KV Condenser **59¢** ea., 10 for.....**$5.50**
.005 MFD—6 KV Condenser **59¢** ea., 10 for.....**$5.50**
14" Attractive Lucite mask, Gold trim.....**$3.95**
16" Attractive Lucite mask, Gold trim.....**$4.50**
19" Attractive Lucite mask, Gold trim.....**$5.25**
20" Attractive Lucite mask, Gold trim.....**$5.95**

CUSTOM BUILT AUTO RADIOS

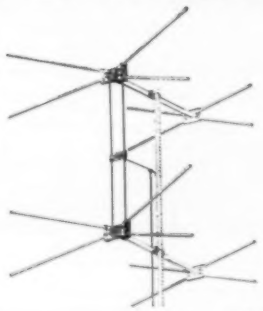
Easily installed. Fine, top quality. Ready to place in your car. Designed for each specific car.

All sets—6 tube. 3 gang; super heterodyne. Extra sensitive circuit. Low battery drain. Beautiful finish and dial. These models now available:

1951—Ford
1949-50—Ford
1951—Chevrolet
1949-50—Chevrolet
1950-51—Studebaker
1948-49-50-51—Hudson
1951—Henry J
1951—Dodge, Plymouth
1949-50—Dodge, Plymouth

List Price, **$59.95**
YOUR PRICE.....**$41.95**

CONICAL TV ANTENNAS



Single.....**$3.99**
Stacked conicals including stacking bars—as pictured.....**$8.49**
4 ft. TV Antenna Mast—Heavy Gauge Steel—rustproof coating. 1½ OD. **$1.25** each. 10 for.....**$11.50**

INDOOR TELEVISION ANTENNA

Now TV reception without the outdoor antenna. Effective range 20 to 25 miles from station. Excellent reception. Easily installed—takes 5 seconds. Easily orientated. Heavy base—will not tilt. Attractive. Friction clutch-type action on the rods. Complete with lead in.....**$2.49**
Case lots of 25.....**$2.25**

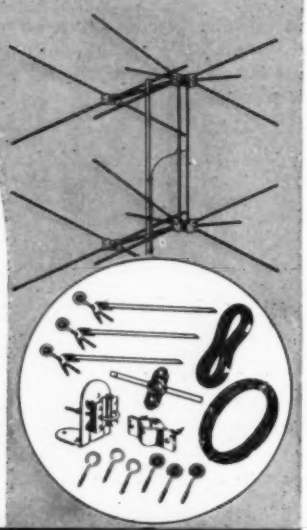
Radio Parts Company, 614 RANDOLPH ST., CHICAGO 6, ILL.

insuline *Conical television* **INSTALLATION KITS**

Everything you need to do a complete installation . . . all in one package! Saves Time Reduces Labor Costs.

INCLUDES ANTENNAS and MASTS

Installing antennas when you have all the necessary elements is a comparatively simple job. That is why Insuline's Installation Kits are meeting such widespread acceptance. These packaged TV installation kits include single and stacked array antennas for fringe area reception, masts, lead-in wire, and all hardware. Excellent reception for every type or make receiver.



TV Accessory Installation Kits

Everything needed to install any type outdoor antennas — Kits for roof, wall and chimney mountings.

FREE! *New catalog of TV Antennas and accessories. Write Dept. RN-4;*

insuline CORPORATION OF AMERICA

INSULINE BUILDING • 36-02 35th AVENUE • LONG ISLAND CITY, N. Y.

West Cost Branch and Warehouse: 1335 South Flower Street, Los Angeles, Calif

Exclusive Canadian Sales Agents: CANADIAN MARCONI COMPANY, Toronto

RADIO and TELEVISION

Over 30 years N.E. Radio Training Center. Train for all types FCC operators' licenses. Also Radio and Television servicing. FM-AM broadcasting transmitters at school. Send for Catalog M.

MASS. RADIO SCHOOL

271 Huntington Avenue Boston 15, Massachusetts

Lic. by Comm. Mass. Dept. Educ.

CODE SENDING RECEIVING SPEED

HIGH SPEED WITHOUT NERVOUS TENSION

REVEALING BOOK shows how "crack" operators develop high speed and proficiency. Learn code for Amateur or Commercial Radiotelegraph License, or improve your sending and receiving with the Candler System which develops radio-telegraph experts and code champions.

CANDLER SYSTEM • Box 928, Dept. 2-D Denver, Colo. **FREE BOOK**

COLOR TONE ON YOUR TELEVISION

Simply attach TELECOLOR FILTER to the front of your set, and enjoy favorite programs in a glorious color tone instead of dull black and white.

TELECOLOR FILTER is one of the latest discoveries, its special formula coloring gives brilliant pleasing color tone, life-like color depth, reduced eyestrain and glare.

TELECOLOR FILTER manufacturer does not claim to give three colors but it guarantees to transform a dull black and white picture into many shades of a glorious color tone. It is also guaranteed to work on any make and model television set.

TELECOLOR FILTER will give contrast similar to the black tube and color tones the high lights on black tubes. It is perfect for daylight or lighted room viewing. Children love the color toned pictures. Wonderful as a gift. Can be enjoyed now and for years to come.

No matter which color system is adopted, TELECOLOR FILTER will still continue to give you color toning enjoyment on the stations broadcasting black and white pictures. Results are better than you get with filters casting four times as much. You will find new interest and happiness in favorite programs with the life-like color depth and clarity that is missing n dull black and white. Free information.

ORDER BY MAIL

HARVARD LABORATORIES, Dept. RN-4
659 Fulton Street, Brooklyn 1, N. Y.

Please send TELECOLOR FILTER

Enclosed: Cash ☐ Check ☐ Money Order ☐

10 inch	$3.00	16, 17 inch	$6.00
12, 14 inch	4.00	19, 21 inch	10.00

Quantity.....Screen Size.....Amount.....

NAME.....

ADDRESS.....

CITY.....STATE.....

several hundred hams were in on the scene listening to the marine gossip and official messages, and often doing a bit of transmitting themselves. As early as 1916, the FCC records show, radio was used by the New York City police to communicate with the harbor patrol boats. In '21, Detroit became police-radio conscious, and Pennsylvania set up the first state system in '23. Railroads became active in radio in '27. And as long ago as '23, the first photo was sent over a radio circuit by Jenkins. A year later *RCA* made the first transatlantic radiophoto transmission when a photo of Charles Evans Hughes was received in New York from London.

Nearly four decades have passed since the sparks began to race through the ether to serve mankind. Today those sparks, now slightly converted and altered, are still speeding through the airlanes, informing, instructing, and bringing cheer to millions. L.W.

CONSTRUCTION TIPS

By JOHN V. NEAL, W6JUZ

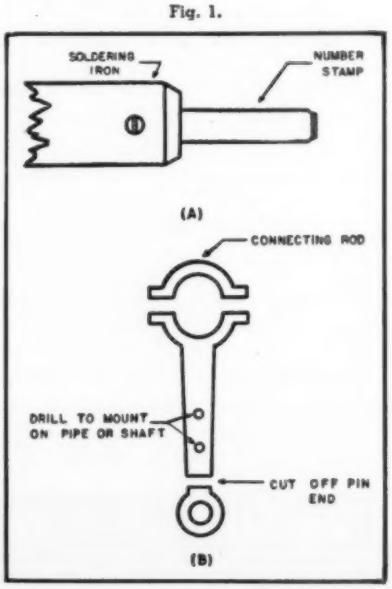
AFTER many years of reading and enjoying the magazine I have come up with a couple of ideas that might interest other readers.

Marking of coil forms, plastic or bakelite, is not always easy and is sometimes impossible. Number coils for wavemeters, bakelite and plastic strips, etc. can be marked by replacing the tip in the soldering iron with one of the number dies which are usually used with a hammer. This method (Fig. 1A) really works and the heating doesn't soften the stamps or impair their effectiveness when used on metal.

The second suggestion is that of using an old connecting rod from a discarded motor to make a good mount for a "plumber's delight" rotary beam. Cut off the wrist pin end (see Fig. 1B) and use the crankshaft bearing end for a saddle or mount for the boom in the center of the beam.

-30-

Fig. 1.



NOTHING.... ABSOLUTELY NOTHING...

Beats a "Surprise" TRADE-IN ALLOWANCE ON YOUR USED TEST AND COMMUNICATION EQUIPMENT

In exchange for a new

hallicrafters

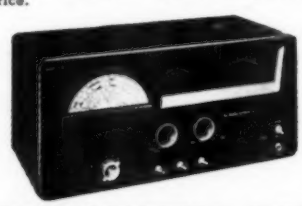
Get your trade-in deal working today! Wire, write, phone or use handy coupon.

HALLICRAFTERS S-72

Shpg. wt. 16 lbs. Price ONLY

$109.95 (less battery)

Buy it for less by applying our liberal Trade-In Allowance against the purchase price.



HALLICRAFTERS S-76

Apply our liberal "Surprise" trade-in allowance against the above price. What have you got to trade?

Shpg. wt. 44 lbs. .....Only **$169.50**

HALLICRAFTERS S-77

Improved AC-DC version of the famous S-40B—the world's most popular Ham receiver. And with a "Surprise" trade-in you can save plenty.

Shpg. wt. 32 lbs.....Only **$99.95**

HALLICRAFTERS SX-71

Shpg. wt. 33 lbs.....Only **$199.50**

For the very thriftiest way to buy your new SX-71, trade your used equipment. Profit with a "Surprise" trade in!

NOVICE AND TECHNICIAN LICENSES
Available July 1st

Here's an easy way to get started in amateur radio. And with "Surprise" Trade-In Allowances Walter Ashe makes it possible for you to get your new Hallicrafters Receiver at big savings. Hallicrafters Receivers are truly precision instruments. Sold in 89 countries, used by 33 governments, they are remembered by veterans, prized by experts and preferred by radio amateurs throughout the world who want a radio that is all radio. Buy with confidence at Walter Ashe, headquarters for Hallicrafters Precision Radio—famous throughout the world.

Values are better because trades are higher at Walter Ashe, originators of "SURPRISE" trade-ins. Take advantage now of the one and only "SURPRISE" allowance on used factory-built equipment. Remember, there is nothing else to compare with it, absolutely nothing. So act now!

FREE!

New 1951 catalog. The "treasure chest" of values in everything in Radio and Electronics.

All prices f.o.b. St. Louis
Phone: CHestnut 1125

Walter Ashe RADIO CO.
THE HOUSE OF "SURPRISE" TRADE-INS
1125 PINE ST. • ST. LOUIS 1, MO.

Walter Ashe Radio Co.
1125 Pine St., St. Louis 1, Mo. RN-51-4

☐ O. K. Walter, *Rush* "Surprise" Trade-in offer on my

.....
(describe used equipment)

for .....
(show make and model No. of new equipment desired)

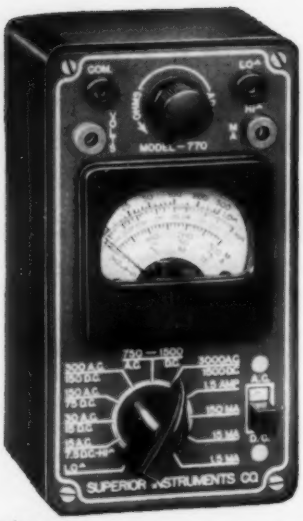
☐ Rush Free Copy of your new 164 page Catalog.

NAME .....

ADDRESS .....

CITY..... Zone..... STATE.....

SEND FOR YOUR COPY TODAY!



SUPERIOR'S new model 770

AN ACCURATE POCKET-SIZE VOLT-OHM MILLIAMMETER

(SENSITIVITY: 1000 OHMS PER VOLT)

FEATURES

★ Compact-measure 3⅛" x 5⅞" x 2¼".
★ Uses latest design 2% accurate 1 Mil. D'Arsonval type meter.
★ Same zero adjustment holds for both resistance ranges. It is not necessary to readjust when switching from one resistance range to another. This is an important time-saving feature never before included in a V.O.M. in this price range.
★ Housed in round-cornered, molded case.
★ Beautiful black etched panel. Depressed letters filled with permanent white, insures long-life even with constant use.

The Model 770 comes complete with self-contained batteries, test leads and all operating instructions.

SPECIFICATIONS

6 A.C. VOLTAGE RANGES:
0—15/30/150/300/1500/3000 VOLTS

6 D.C. VOLTAGE RANGES:
0—7.5/15/75/150/750/1500 VOLTS

4 D.C. CURRENT RANGES:
0—1.5/15/150 MA. 0—1.5 AMPS.

2 RESISTANCE RANGES:
0—500 OHMS 0—1 MEGOHM

$14.90 NET

Superior's new model 670

SUPER-METER

***A COMBINATION* VOLT-OHM MILLIAMMETER PLUS CAPACITY REACTANCE INDUCTANCE AND DECIBEL MEASUREMENTS**

SPECIFICATIONS:

D.C. VOLTS: 0 to 7.5/15/75/150/750/1,500/7,500 Volts
A.C. VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts
OUTPUT VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts
D.C. CURRENT: 0 to 1.5/15/150 Ma. 0 to 1.5 Amperes
RESISTANCE: 0 to 500/100,000 Ohms 0 to 10 Megohms
CAPACITY: .001 to .2 Mfd. .1 to 4 Mfd. (Quality test for electrolytics)
REACTANCE: 700 to 27,000 Ohms 13,000 Ohms to 3 Megohms
INDUCTANCE: 1.75 to 70 Henries 35 to 8,000 Henries
DECIBELS: — 10 to + 18 + 10 to + 38 + 30 to + 58

ADDED FEATURE:

The Model 670 includes a special GOOD-BAD scale for checking the quality of electrolytic condensers at a test potential of 150 Volts.

The Model 670 comes housed in a rugged, crackle-finished steel cabinet complete with test leads and operating instructions. Size 5½" x 7½" x 3".

$28.40 NET

The New Model 200 **AM and FM SIGNAL GENERATOR**

SPECIFICATIONS

★ **R.F. FREQUENCY RANGES:** 100 Kilocycles to 150 Megacycles.
★ **MODULATING FREQUENCY:** 400 Cycles. May be used for modulating the R.F. signal. Also available separately.
★ **ATTENUATION:** The constant impedance attenuator is isolated from the oscillating circuit by the buffer tube. Output impedance of this model is only 100 ohms. This low impedance reduces losses in the output cable.
★ **OSCILLATORY CIRCUIT:** Hartley oscillator with cathode follower buffer tube. Frequency stability is assured by modulating the buffer tube.
★ **ACCURACY:** Use of high-Q permeability tuned coils adjusted against 1/10th of 1% standards assures an accuracy of *1% on all ranges from 100 Kilocycles to 10 Megacycles* and an accuracy of 2% on the higher frequencies.
★ **TUBES USED:** 12AU7—One section is used as oscillator and the second is modulated cathode follower. T-2 is used as modulator. 6C4 is used as rectifier.

The Model 200 operates on 110 Volts A.C. Comes complete with output cable and operating instructions.

$21.85 NET

USE CONVENIENT RUSH ORDER FORM ON OPPOSITE PAGE →

GENERAL ELECTRONIC DISTRIBUTING CO. DEPT. RN-4, 98 PARK PLACE NEW YORK 7, N. Y.

Superior's New Model TV-11

TUBE TESTER

Extra Service

The Model TV-11 may be used as an extremely sensitive Condenser Leakage Checker. A relaxation type oscillator incorporated in this model will detect leakage even when frequency is one per minute.

Specifications

- Tests all tubes including 4, 5, 6, 7, Octal, Lock-in, Peanut, Bantam, Hearing-aid, Thyratron, Miniatures, Sub-Miniatures, Novals, Sub-Minars, Proximity Fuse Types, etc.
- Tests for "shorts" and "leakages" up to 5 Megohms.
- Uses the new self-cleaning Lever Action Switches for individual element testing. Because all elements are numbered according to pin-number in the RMA base numbering system, the user can instantly identify which element is under test. Tubes having tapped filaments and tubes with filaments terminating in more than one pin are truly tested with the Model TV-11 as any of the pins may be placed in the neutral position when necessary.
- The Model TV-11 does not use any combination type sockets. Instead individual sockets are used for each type of tube. Thus it is impossible to damage a tube by inserting it in the wrong socket.
- Free-moving built-in roll chart provides complete data for all tubes.
- Newly designed Line Voltage Control compensates for variation of any line voltage between 105 Volts and 130 Volts.

The Model TV-11 operates on 105-130 Volt 60 Cycles A.C. Comes housed in a beautiful hand-rubbed oak cabinet complete with portable cover. Size 11½" x 13" x 6". Shipping Weight 15 lbs.

***NOISE TEST** — **Phono Jack on front panel for plugging in either phones or external amplifier will detect microphonic tubes or noise due to faulty elements and loose external connections.**

$47.50 NET

MONEY BACK GUARANTEE!!

GENERAL ELECTRONIC DISTRIBUTING CO. DEPT. RN-4, 98 PARK PLACE, NEW YORK 7, N. Y.
Phone—REctor 2-1677

GENTLEMEN: PLEASE RUSH THE MATERIAL LISTED BELOW:

QUANTITY	MODEL	PRICE	TOTAL

Name_____

Address_____

City_____ Zone_____ State_____

$_____ (Payment in Full Enclosed)

$_____ (Deposit Enclosed — Ship Balance C.O.D.)

INDISPENSABLE!

PHOTOFACT BOOKS

Photofact Television Course. Covers TV principles, operation and practice. 216 pages; profusely illustrated; 8½ x11". Order **TV-1** ..... Only **$3.00**

Television Antennas. New 2nd edition. Describes all TV antenna types; tells how to select, install, solve troubles. Saves time; helps you earn more. 200 pages; illustrated. Order **TAG-1** ..... Only **$2.00**

Television Tube Location Guide. Accurate diagrams show position and function of all tubes in hundreds of TV sets; helps you diagnose trouble without removing chassis. 200 pages; pocket-size. Order **TGL-1** ..... Only **$1.50**

1949-1950 Record Changer Manual. Vol. 3. Covers 44 models made in 1949, including multi-speed changers and wire and tape recorders. Original data based on actual analysis of equipment. 286 pages; 8½ x 11"; paper-bound. Order **CM-3** ..... Only **$3.00**

1948-1949 Changer Manual. Vol. 2. Covers 45 models made in 1948-49. Paper bound. Order **CM-2**. Only **$4.95**

1947-1948 Changer Manual. Vol. 1. Covers 40 post-war models up to 1948. Order **CM-1** ..... Only **$4.95**

Recording & Reproduction of Sound. A complete authoritative treatment of all phases of recording and amplification. 6 x 9". Order **RR-1** ..... Only **$5.00**

Post-War Audio Amplifiers. Vol. 2. A complete analysis of 104 well-known audio amplifiers and 12 well-known tuners made in 1949-50. 368 pages, 8½ x 11". Order **AA-2** ..... Only **$3.95**

Post-War Audio Amplifiers. Vol. 1. Covers 102 amplifiers and FM tuners made through 1948. 352 pages. Order **AA-1** ..... Only **$3.95**

Auto Radio Manual. Complete service data on more than 100 post-war auto radio models. Covers over 24 mfgrs. 350 pages, 8½ x 11". Order **AR-1** ..... Only **$4.95**

Communications Receiver Manual. Complete analysis of 50 popular communications models. 246 pages, 8½ x 11". Order **CR-1** ..... Only **$3.00**

Radio Receiver Tube Placement Guide. Accurate diagrams show where to replace each tube in 5500 radio models, covering 1938-1947 receivers. 192 pages, pocket-size. Order **TP-1** ..... Only **$1.25**

Dial Cord Stringing Guide. Vol. 2. Covers receivers made from 1947 through 1949. Shows you the one *right* way to string a dial cord in thousands of models. Pocket-size. Order **DC-2** ..... Only **$1.00**

Dial Cord Guide. Vol. 1. Covers sets produced 1938 through 1946. Order **DC-1** ..... Only **$1.00**

Radio-TV Industry Red Book. 2nd Edition. Complete data on replacement parts for 22,000 sets made 1938-1950, including valuable TV information. Covers all major replacements. Over 600 pages ..... Only **$3.95**

Making Money in TV Servicing. Tested, proved methods of operating a profitable TV service business. Written by Eugene Ecklund, B. E. E., former manager of the National Service Department, Allen B. DuMont Laboratories, Inc. Covers planning, financing, work control, purchasing, service charges, advertising—plus much more. Own this practical guide to success now. Over 130 pages. Order *MM-1* .... Only **$1.25**

Order from your Parts Jobber or write direct to HOWARD W. SAMS & CO., INC., 2201 E. 46th St., Indianapolis 5, Indiana

HOWARD W. SAMS & CO., INC.

Radio-Radar-Sonar
(*Continued from page* 34)

duplicate elsewhere since the equipment on which they work is out of the range of most educational budgets. Electronic technicians now receive training comparable to that given pilots when the elaborateness of facilities and cost of the courses are taken into consideration. This same thing applies to similar educational facilities offered by the Army and Air Force and to some extent the Coast Guard and the Marine Corps. Very few of the men who received such training will dispute its value in civilian life. There are openings in the merchant marine, with civilian airlines, the CAA, and the various branches of the FCC as well as industry for men who fully understand the operation of such equipment.

In time of peace or demobilization, radio or electronic technicians with military training enjoy excellent civilian employment opportunities. In time of national emergency they insure national security. And when war comes, they enable our country to substitute technology for human lives to win the only battle that really counts —the "last one."

—30—

A PORTABLE FUSED POWER OUTLET BOX

By JOHN W. SPONSLER

HERE is one of the handiest gadgets around the shop since the invention of the "cube-tap." But unlike its predecessor, this portable power distribution box has several useful auxiliary features such as power switch, fuse, and cord grip, not to mention rubber bumper feet.

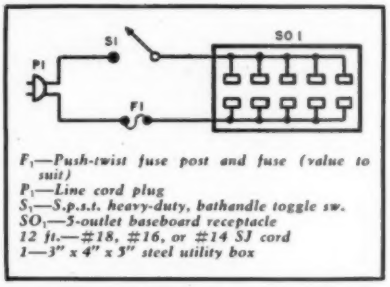
The base of the unit is a 3x4x5 inch black wrinkle finished steel utility box. The covers were removed and in one of them was cut a hole large enough to allow the seating of an ordinary five outlet baseboard receptacle. Although only one receptacle is shown in the photo, similar units can be installed on the sides of the box frame. However it is the author's opinion that a much neater appearance would result by adding another box to one end of the existing case and installing a second receptacle in it.

Four holes were drilled near the corners of the other cover and rubber bumper feet were attached. These feet give the finished box a "dressy" appearance as well as making it scratch- and skid-proof.

Three holes were drilled in the box frame on the 3x4 inch side. The center hole was punched out to ¾ inch while the two outside holes were reamed to allow mounting a fuse post on the left and a s.p.s.t. toggle switch on the right.

The box is wired as shown in Fig. 1. The switch, fuse post, and the cord grip are installed in the three holes provided and after stripping about six inches from the rubber cord jacket, the cord is passed in through the cord grip and the grip is screwed down tight, firmly clamping the cord in place.

One conductor is soldered to the rear terminal of the fuse post while the other conductor is soldered to one side of the toggle switch. Wires of the same gauge and insulation are run from the shell of the fuse post and the remaining side of the toggle switch to the receptacle as shown in Fig. 1. By wiring the box in this fashion, when the toggle switch is turned off and the fuse is removed, any device which is plugged into the receptacle will be completely isolated from the line. (We know it's just as easy to pull out the plug at the wall socket, but that's usually way down under the bench in a dark corner). Although not included in this box, a safety suggestion is made here. Three conductor rubber cord could be used. The third conductor could be bonded to the case at one end, while the other end of the conductor appearing at the rubber power plug could be equipped with an alligator clip for grounding. This would prevent the box from ever getting "hot."



F_1—Push-twist fuse post and fuse (value to suit)
P_1—Line cord plug
S_1—S.p.s.t. heavy-duty, bathandle toggle sw.
SO_1—5-outlet baseboard receptacle
12 ft.—#18, #16, or #14 SJ cord
1—3" x 4" x 5" steel utility box

Fig. 1. Diagram for wiring power outlet box.

In the final analysis, you exclaim—

"Why so many outlets?"

The answer is simple. Count up all the equipment usually in operation while building and testing. There's the soldering iron, signal generator, oscilloscope, test lamp, the device you are working with, etc. The switch on the box has the added advantage that by turning off one switch everything is shut off. There'll be no more coming into the shop the next morning to find that the soldering iron ran all night because it was plugged in at that outlet down the bench behind the tool box.

—30—

Fig. 2. Over-all view of completed unit.

IN TELEVISION, RADIO, AND ELECTRONIC EQUIPMENT
GET TOP VALUES FIRST...

Here's a few of the many outstanding Concord Bargains

IN THE FREE

PORTABLE "BOOK RADIO"

Looks like a book

The most novel idea yet for a portable radio... When closed it looks just like a beautifully leather bound book. But when you open it you're immediately delighted by the clear, big set tonal qualities that come to your ear. Just imagine the fun you'll have with your friends... how surprised they will be when suddenly your "book" begins to play. It will be a constant companion this summer at the beach, on picnics and at parties. You'll be surprised too by its unusually light weight... weighs only 4-1/2 pounds... lighter than a real book of comparable size.

Inside, it's ruggedly constructed to give you long, satisfying service. Uses the finest components in a modern superhet circuit for extra strong reception over the entire standard broadcast band. Equipped with built-in antenna. Uses the following miniature tubes: 3S4, 1S5, 1T4, 1R5. 3" dynamic speaker has Alnico V magnet. Operates on the following self-contained batteries: (2) 1-1/2 volt "A" cells and (1) 67-1/2 volt "B" battery. Size: 9-3/4" high, 7" wide, and 2-3/4" thick. Durably bound in rugged simulated leather. Less Batteries. Shpg. wt. 5 lbs. Be sure and order yours now! **13.95**

1-442R - Each $14.95. . . . . Lots of 3, Each . . .
20-19818R - 67-1/2 volt Battery for above. Ea. 1.59
20-20625R - 1-1/2 volt Battery for above. Ea. . . . . 9¢

CONCORD TV CONICALS

High quality conical TV antennas designed for superior performance. Full-hard elements and all-aluminum construction provide maximum strength and eliminate excessive weight and rust problems. Broad band reception on all TV channels plus FM. High signal-to-noise ratio, excellent front-to-back ratio, matches 72, 150, or 300 ohm input impedance. Ridged U-bolt mast clamp bracket set at proper balance point prevents antenna from slipping or twisting on mast. Fits mast up 1-1/2" O.D. Supplied less mast. **5.45**

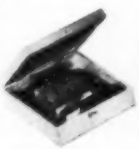
28-24265R - Single Bay. (Not illus.) Wt. 6 lbs. Net . .
28-24266R - Double Bay. (Illus.) Wt. 12 lbs. Net 11.45

DURO GRINDER KIT

Heavy duty Duro Hand Grinder... Complete with accessory tools for grinding, buffing, polishing, or engraving work. Shaped to fit the hand, grinder is 7" long . . . ideal for close precision work. Chuck capacity 1/8". Grinder has grease-sealed ball bearing. Durable light weight metal housing encloses all working parts. Complete with 7 standard tools, 7-1/2' rubber covered cord and plug. Operates on 110 volts, 60 cycles AC or DC. Shpg. wt. 5-1/2 lbs.

18-15644R. **14.95**

FLEXIBLE SHAFT TOOL



Fairchild model F2. Adequately fills the hobbyist's engraving, buffing, grinding, and routine polishing needs. Precision dynamically balanced 1/20 HP motor turns up 15,000 RPM at handpiece with power to spare when using 10 std. tools supplied. Pencil size hand piece is perfect for close work. Takes any standard 3/32" or 1/8" shank tool... 3' long flexible plastic shaft allows oil-free operation. Complete with selected accessory tools: 2 wrenches, flexible shaft motor and bracket for motor. Factory tested. Packed in sturdy blonde wood box. Operates on 110-120 volts AC or DC. Shpg. wt. 7 lbs.

18-15645R. **14.95**

GE TUNGAR BULBS

GE type 206501 for replacement in chargers, "A" eliminators, etc. Rated at 2 amps. List $5.00.

99-646R. **2.49**

HI-FREQUENCY ANTENNA

...originally used with BC 645... readily adaptable to Citizens Band Radio. Covers frequency range 435 to 500 mc. Element length 5-1/4". Ready to mount... includes coax cable connection, mounting plate and gasket. Requires 7/8" mounting hole. Mounting center 1-3/4" x 7/8". Optimum operation is provided by using 1 each for transmitting and receiving.

99-9413R - 2 for $1.75. . . . . Singly **95c**

J-38 TELEGRAPH KEY

Mounted on black bakelite base, 4-3/4 x 3". Has jumper strip, binding posts and circuit closing switch. 1/16" solid silver keying contacts. Metal parts cadmium-plated. Excellent for sounder and buzzer telegraph. Ideal low-cost key for CW hams. Order yours today!

99-6543R. **79c**

SOUND POWER PHONES

Pair of Sound Powered Phones selling at unheard of low price. Serves as complete 2-way communication system. Ideal for use while installing radio and TV antennas.

99-7053R - (Pair). **5.95**

2-Conductor #19 twist pair, wire for above.

19-20895R - 100 ft. for $2.50. . . . . per ft. **3c**

CONCORD BUYER'S GUIDE

- Complete Listings of Available Merchandise
- Current Low Prices
- Prompt Expert Shipment
- Satisfaction Plus

SEND FOR YOUR FREE COPY NOW!

CONCORD RADIO

"WHERE THE WORLD SHOPS"

Mail Order Center and Showroom

901 W. Jackson Blvd., Chicago 7, Ill.

EXPORT For PROMPT Service on Export Orders & Inquiries Address to CONCORD RADIO CORP., EXPORT DIVISION, 901 West Jackson Blvd., Chicago 7, Illinois.

FILL IN AND MAIL TODAY

CONCORD RADIO CORP., Dept. RD-51
901 West Jackson Blvd., Chicago 7, Illinois

☐ Please forward your latest Buyer's Guide

Name. . . . . .

Address. . . . . .

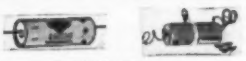
City. . . . . Zone... State. . . . . .

BE FIRST TO KNOW WHAT'S NEW IN THE FIELD

McGEE'S "SUPER STORE" OPERATION SAVES YOU MONEY!

5 OZ4 TUBE & 5 VIB. DEAL No. RN-V5 ..... $9.50

Here's a red hot deal for you fellows that do a lot of auto radio service. 5 standard brand metal OZ4 tubes and 5 of our famous 4-prong serrated can vibrators. This vibrator is of the latest design, for long life. Standard diameter can, short enough to fit all Chrysler auto sets, also fits Motorola, etc. Our 20th Anniversary, big deal No. RN-V5. You can get 5 OZ4 metal tubes and 5 4-prong vibrators, all for **$9.50.** Shipping weight 3 lbs.



MN-8.	8 mfd 450 volt	39c
MN-16.	16 mfd 450 volt	49c
MN-30.	30 mfd 450 volt	59c
MN-20.	20 mfd 150 volt	39c
MN-40.	40 mfd 150 volt	49c
MN-220.	20-20 mfd 150v	49c
MN-53.	50-30 mfd 150v	59c
MN-442.	40-40-20 mfd 150v	69c

All cond. guaranteed one year.

RED HOT SPEAKER VALUES

McGee has a tremendous stock of 100,000 speakers to fill your needs. Every speaker is fully guaranteed. Order your speakers now.

4 inch, square	1 oz. magnet	$1.69
5 inch, pincushion	1 oz. magnet	1.79
6 inch, pincushion	1.47 oz. magnet	2.79
4 x 6 inch	1 oz. magnet	2.39
5 x 7 inch, oval	1.47 oz. magnet	2.49
7 inch, pincushion	2.15 oz. magnet	3.49
8 inch, pincushion	2.15 oz. magnet	3.49
6 x 9 inch, oval	2.15 oz. magnet	3.49

100 Molded Plastic Bypasses $9.95

100 molded plastic tubular bypass condensers. All 600 volt. And all by the same nationally known mfgr. Regular dealers' net are over two and one-half times our 20th Anniversary sale price. You'll chuckle when you look these over. Here's what you get: 10-.001, 10-.002, 20-.005, 20-.01, 20-.02, 10-.05 and 10-.1. Our big deal No. RN-202. 100 plastic tubulars. Shipping weight 2 lbs. Net price, **$9.95.**

100 600 VOLT TUBULARS $6.95

100 top quality 600 volt tubular by-pass condensers. Made this year by a famous condenser factory. Don't confuse these with grab-bag surplus. McGee's deals are guaranteed to please you. Here's what you get: 10-.001, 10-.002, 20-.005, 20-.01, 10-.02, 20-.05 and 10-.1 600 volt condensers. Our big deal No. RN-203. Shipping weight 2 lbs. Net price, **$6.95.**

20 50 x 30 150 V. ELECTROLYTICS $10.95

Here's a red hot value. 20 of our XX quality replacement electrolytics. The most popular condensers in use today. Takes care of 90% of your AC-DC radio filter needs. Compact construction 1950 production. 1-year guarantee. 50-30 mfd, 150 volt, housed in a cardboard tube with common negative, has long flexible leads. 20th Anniversary, big deal No. RN-204. Sale price, **$10.95.**

SELENIUM RECTIFIERS

65 mil Selenium Rectifier, net	59c each
100 mil Selenium Rectifier, net	69c each
150 mil Selenium Rectifier, net	79c each
200 mil Selenium Rectifier, net	$1.09 each
250 mil Selenium Rectifier, net	1.19 each
350 mil Selenium Rectifier, net	1.49 each
450 mil Selenium Rectifier, net	1.69 each

McGee offers you the famous make rectifiers. All standard 130 volt.

1 or 4 VOLT CRYSTAL CARTRIDGES $1.99

McGee offers you a famous make crystal cartridge. Standard size and shape, but very light weight. Will track on ¾ oz. or more pressure. Stock A-6, 6 volt output, replaces Astatic L-70 etc., Net **$1.99.** Stock No. A-10, 4 volt output, replaces Astatic L-72 and L-82, etc., Net **$1.99.** Buy 10 assorted for **$19.00.**

5-Station Intercom Master $16.95

Model 2700 5-station intercom master, in an attractive walnut cabinet 10x5½x6". Push-button for each sub and talk-listen switch and volume control. AC-DC amplifier with lots of power and full size Alnico V PM speaker. 1950 production of a famous factory. Only 300 left, weight 7 lbs. Model 2700, net. **$16.95.**

10-Station Intercom Master $24.95

Heavy duty Model 2520 10-station intercom master in beautiful walnut cabinet, 14x6½x7½" high. Powerful AC amplifier with 6V6 output, 6SJ7 and 80 rectifier. Heavy 2.15 oz. Alnico V 5" PM speaker. Push-button for each of 10 stations, talk-listen switch and all call buttons; volume control, installs as a 3-wire system. A fortunate purchase by McGee makes a saving for you. Model 2520, weight 12 lbs. Net. **$24.95** each.

SUB-STATION FOR ABOVE INTERCOMS $3.95

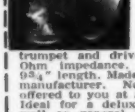
Model MG-300 molded walnut plastic sub-station with call-back switch and heavy PM speaker, 5½x8½x3½", for wall or desk. Weight 2 lbs. Net, **$3.95** each: 5 for **$18.95.**

3 wire intercom cable, plastic, **$1.95** per 100 ft.; 500 ft., **$9.50.**

25-WATT TRUMPET AND DRIVER $16.95

Full 12-month guarantee on this 25 Watt, all-weather re-entrant type trumpet and driver combination. 15 Ohm impedance. Bell diameter 9¾" length. Made by a famous speaker manufacturer. New 1951 production, offered to you at a tremendous saving. Ideal for a deluxe paging speaker as well as general P.A. use. Complete with adjustable mounting bracket. Shipping weight 6 lbs.

Model RE-17X, 25 Watt Trumpet and Driver. Net price **$16.95**



30-WATT TRUMPET and DRIVER $28.95

Model XX100-RM35. The finest trumpet driver combination value that we know. You get a full 30 Watt, 15 Ohm, PM Driver, guaranteed for 12 months and a 31½ ft. spun aluminum trumpet. (Bell diameter 18", air column 31½ ft., 16" overall length.) Both driver and trumpet have standard threads. (1¾-18) Driver is completely weather and waterproof. Not surplus, but the latest 1951 production, by a famous speaker manufacturer. Trumpet furnished complete with adjustable mounting bracket.

RM-35, 30 Watt Driver unit only, shipping weight 6 lbs.

Net price **$15.95**

XX-100, 31½ ft. Trumpet only, shipping weight 15 lbs.

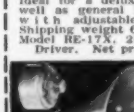
Net price **$13.95**

XX100-RM35, combination trumpet and driver complete. Net price.. **$28.95**

SUPER HEAVY DUTY 10" PM $6.95

We made a special purchase on several hundred 20 watt, 10", 32 oz. Alnico 3 magnet PM speakers. Deep throat and easy moving cone. Ideal for all high fidelity sound systems and radio replacement. The magnet on this speaker is usually used on a 15" size. Very efficient, good high and bass response. You'll appreciate it when you get your hands on this speaker. Attractive copper finish. 8 ohm voice coil. Stock No. 1025PS. Weight 7 lbs. Net price **$6.95** each.

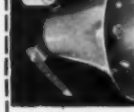
Order three of these and use them in a cluster of three. They will take 60 watts of audio and have more cone area than any 15" speaker. For high power, top quality P.A. work. Think this over. 3 No. 1025PS speakers for only **$19.95.**



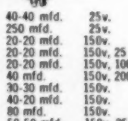
12" 32 OZ. PM SPEAKER $7.95

12", 32 oz. magnet, 20 watt PM speaker, with 8 ohm voice coil. A regular $17.00 list Consolidated speaker. Weight 8 lbs. No. CN-1232, **$7.95** each, 4 for **$29.95.**

10" HEAVY DUTY P.M. WITH BAFFLE RED HOT SPECIAL $8.95



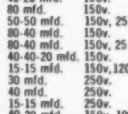
Super heavy duty 10" 32 oz. Alnico 3 PM speaker, with 8 ohm voice coil. Ideal for music box operators and all sound installations. A lucky purchase makes this possible. The baffle is of the slanting wall type mounting, made of plywood and covered with leatherette. Stock No. MP-10. Net price **$8.95** each. In lots of 3 or more, **$8.50** each.



BIG SALE ALUMINUM CAN ELECTROLYTICS

McGee offers you Nationally known brands of FP type electrolytic condensers at a tremendous saving. After these are gone, we don't know where we can buy any more to sell at these prices. Order a good supply now. Unconditionally guaranteed.

40-40 mfd.	25v.	FP cond. 1	x2"	$0.19	40-40 mfd.	150v, 40-40 25v. FP cond.	1½ x2"	$0.39
250 mfd.	25v.	FP cond. 1	x2"	.29	60-40 mfd.	150v, 10 25v. FP cond.	1 x3"	.49
20-20 mfd.	150v.	FP cond. 1	x2"	.29	40 mfd. 300v, 50 250v, 20 200v. FP cond.		1½ x3"	.59
20-20 mfd.	150v, 25 25v.	FP cond. 1	x2"	.34	15 mfd.	400v, 10-525ov. FP cond.	1 x3"	.49
20-20 mfd.	150v, 100 25v.	FP cond. 1	x2"	.44	8 mfd.	450v.	FP cond. 1 x3"	.29
40 mfd.	150v, 200 10v.	FP cond. 1	x2"	.29	10 mfd.	450v.	FP cond. 1 x3"	.34
30-30 mfd.	150v.	FP cond. 1	x2"	.39	16 mfd.	450v.	FP cond. 1 x3"	.34
40-20 mfd.	150v.	FP cond. 1	x2"	.39	20 mfd.	450v.	FP cond. 1 x3"	.39
80 mfd.	150v.	FP cond. 1	x2½"	.29	24 mfd.	450v.	FP cond. 1 x3"	.39
50-50 mfd.	150v, 25 25v.	FP cond. 1	x2½"	.49	30 mfd. 450v, 30 350v, 40 25v		FP cond. 1 x3"	.49
80-40 mfd.	150v.	FP cond. 1	x3"	.49	20-10 mfd.	450v.	FP cond. 1½ x3"	.69
80-40 mfd.	150v, 25 25v.	FP cond. 1	x3"	.59	20-20 mfd.	450v.	FP cond. 1½ x3"	.89
40-40-20 mfd.	150v.	FP cond. 1	x3"	.59	32 mfd.	450v.	FP cond. 1 x3"	.39
15-15 mfd.	150v, 1200 1½ v.	FP cond. 1	x2"	.49	30-15-10 mfd.	450v, 20 25v.	FP cond. 1½ x3"	.69
30 mfd.	250v.	FP cond. 1	x2"	.19	10-10-10 mfd.	450v, 20 25v.	FP cond. 1 x3"	.59
40 mfd.	250v.	FP cond. 1	x2"	.19	80 mfd.	450v.	FP cond. 1½ x3"	.59
15-15 mfd.	250v.	FP cond. 1	x2"	.29	20-20-20 mfd.	450v.	FP cond. 1½ x3"	1.19
40-20 mfd.	150v, 100 15v.	FP cond. 1	x3"	.39	40-30-10 mfd.	450v, 20-25v.	FP cond. 1½ x3"	1.49
30-50 mfd.	150v, 20 50v, 100 10v.	FP cond. 1½	x2"	.49	40-40-40 mfd.	450v.	FP cond. 1½ x3"	1.49

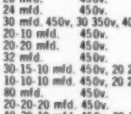


UNIVERSAL OUTPUTS

Universal replacement output transformers for push-pull or single plate, 2500 to 15,000 ohms, from 2 to 16 ohm voice coil. Standard size strap mounting with long leads and lugs for voice coil connections, U-5, 5 watt universal.

Net	$ .99
U-8, 8 watt universal	1.19
U-15, 15 watt universal	1.39
U-20, 20 watt universal	1.79

5 watt, single universal output transformer. Any tube to 3.2 ohm voice coil. It pays to have some of these around the shop. They come in handy. No. JJ-4, ea. **79c;** 10 for **$7.50;** 25 for **$17.50.**



GE. VR $5.95

G.E. variable reluctance pickup arm with separate 2 and 5 mil needles for playing all records. The finest Electric ball bearing pickup arm, UPX-004 with RPX-041 microgroove variable reluctance cartridge and replaceable 1 mil stylus; furnished with an extra 3 mil G.E. stylus for playing 78 RPM records, at no extra charge. Total value over **$41.00.** Stock No. 0042. Net price **$5.95.** 3 speed phono motor and turntable, for 33⅓, 45 and 78 RPM **$8.95** extra.

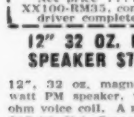
4-PRONG VIBRATORS $1.29 IN ALUMINUM SERRATED CANS 10 FOR $11.90

4 MILLION AUTO RADIOS BUILT IN 1950 AND HERE IS THE PERFECT REPLACEMENT VIBRATOR FOR MOST OF THEM.

Latest 1951 production by a top quality manufacturer. Fully guaranteed one year. Quiet running. A result of modern vibrator engineering and research. Replaces Motorola, Chrysler and any standard 4 Prong non-sync Vibrator. McGee contracts for a tremendous quantity to take care of your 1951 needs. Stock #V-53. Standard 4 Prong Vibrator **$1.29** each, 10 for **$11.90.** Offset 4 Prong for Delco, etc., **$1.39** each. 10 for **$12.90.**

Buick Replacement same as Delco 5050500. Fits all Buicks, 1937 thru '47, etc. **$1.95** each, 10 for **$17.90.**

Mallory 534C 7 Prong Reversible Sync., **$1.95** each, 10 for **$17.90.** Offset 4 Prong for Delco, etc., **$1.39** each



19 TUBULAR ELECTROLYTICS DEAL RN-PL19 $7.50

19 tubular electrolytics, guaranteed for one year. All fresh stock in aluminum tubes with cardboard insulating sleeves. You must be satisfied or money back. You get, 10 8 mfd, 450 volt, 4 16 mfd, 450 volt, 3 20 mfd, 150 volt and 2 40 mfd, 150 volt condensers. Shipping weight 2 lbs. Deal #RN-PL19. Net **$7.50.**

10 FP ELECTROLYTICS DEAL RN-10DS $3.49

10 assorted F.P. aluminum can electrolytics. Popular twist tap mounting. Mostly multiple section banks, 150, 350 and 450 volts. A red hot deal. Shipping weight 2 lbs. Deal #RN-10DS. Net **$3.49.**

10 BOXES OF PILOT LIGHTS $5.49

Pilot lamps, boxed 10 to a handy carton. American made. 7 boxes #47, 1 box #40, 1 box #44 and 1 box #46. A total of 100 lamps. Deal #CM-51. Net **$5.49.** 100 #47 imported panel lamps. Guaranteed. 100 to the carton. Deal #RN-J47. Net **$4.49.**

50 8 MFD. 450 VOLT COND. MONTHLY SPECIAL $16.95

McGee's serviceman's monthly special for April. You get 50 of our regular 39c MN-8 MFD 450 Volt Tubular Electrolytics for only **$16.95.** Full one-year guarantee. Aluminum Tubular construction with cardboard insulating sleeves. Fresh stock 1951 production. 2nd to none. Shipping weight 3 lbs. Deal No. NPL-58 50 8MFD 450 Volt Tubulars for **$16.95.**

V.M. 3 SPEED Record Changers

VM Model 406 deluxe 3 speed automatic record changer—plays them all—intermixes records of the same speed—equipped with a flip over crystal pickup with twin needles—a very sleek designed record changer—base size 12¼x13. Ship. weight 12 lbs. VM-406. Net **$33.21.**

Buy the VM-950 changer with or without base. Choice of G.E. VR or crystal cartridge. We think the VM-950 record changer is the finest in America. It automatically plays all records all speeds and all sizes: 12 10-in., 33⅓ or 78 rpm, 10 12-in., 33⅓ or 78 rpm and 12 and 10-in. records of the same speed intermixed, 12 7-in. 33⅓ or 12 7-in. 45 rpm. Automatically shuts off after the last record. Size 13 13/16x15⅞x7¼ in. high. Offered with crystal cartridge, G.E. VR cartridge, or either with a base. VM-950, 3 speed changer with standard output crystal cartridge and needles of 1 and 3 mil. (78 rpm, 33⅓, 45 rpm.) Net **$29.62.**

VM-950GE, 3 speed changer with the new RPX-050 magic button, all-in-one variable reluctance cartridge with stylus. Net **$32.82.**

VM-955, 3 speed changer with crystal cartridge on a base. Net **$32.01.**

VM-955GE, 3 speed changer with RPX-050 VR cartridge and stylus; with base. Net **$35.19.**

2-STATION INTERCOM $16.95

Complete, top quality two station intercom system, $14.95. With 50 feet of connecting cable. New 1951 production, housed in matching walnut plastic cases. Master has push-to-talk switch. May be used on wall or desk. Conventional amplifier using 12SJ7, 50L6 and 35Z5 tubes. Stock No. MG-38, weight 8 lbs. Net price **$16.95.** Extra sub for use in parallel with other sub as a non-selective 3 station system. **$3.95.**

RED HOT ELECTROLYTIC SPECIALS

ORDER 100 ASSORTED FOR $37.50

Stock No. EC-4. Capacity 40-40-20, voltage 150v. Net each	40c
Stock No. EC-552. Capacity 50-50-, 200; voltage 150-50v. Net each	40c
Stock No. EC-3132. Capacity 40-40, 200; voltage 150-15v. Net each	40c

Tubulars in cardboard tubes with long flexible leads. Fully guaranteed.

10,000 to sell at this bargain price.

McGEE RADIO COMPANY Prices F.O.B. K.C. Send 25% Deposit with Order, Balance Sent C.O.D. With Parcel Post Orders, Indicate Postage

TELEPHONE VICTOR 9045. WRITE FOR FLYER 1422 GRAND AVE., KANSAS CITY, MISSOURI

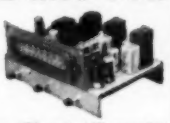
McGEE HAS COMPLETE KITS FOR SCHOOLS AND CUSTOM BUILDERS

7-TUBE FM-AM TUNER

★ AC SELF POWERED

★ 3 GANG TUNING ★ A COMPLETE KIT

$29.95



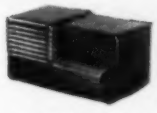
McGee has ready for delivery, this self powered AC, 7 tube FM and AM superhet tuner kit. Build yourself a professional looking tuner that may be connected to any audio amplifier. Receives broadcast 550 to 1650 kc and FM 88 to 108 mc. A 3 gang tuning condenser is used on both FM and AM. This extra stage of THF makes a smoother working tuner. 2 IF stages on FM and one IF stage on AM (I.F. frequency 456 and 10.7 mc). Lighted slide rule dial with metal escutcheon plate. Our own lab designed and wired an original tuner using these parts. Chassis is ready punched and painted. Everything furnished including tubes and diagrams. Shipping weight 12 lbs. Stock No. RAL-8, net price $29.95.

MODEL ME6-2 $19.95

NEW MODEL 6-TUBE, 2-BAND RADIO KIT

A FULL 2-GANG SUPERHET KIT

RECEIVES 550-1600 KC PLUS 6-18 M.C.



McGee's new 1951, 6 tube; AC-DC 2 band radio kit. Receives broadcast, 550 to 1600 kc and short wave, 6 to 18 mc. A straight forward superhet circuit with 2 gang tuning condenser, 456 kc I.F. transformers, etc. 5" PM speaker illuminated slide rule dial. Everything furnished, including tubes, diagram and a photo showing view of underside of completely wired chassis. The chassis pan and dial parts are factory production. With this kit, you can build a commercial looking and factory quality 2 band radio, housed in a streamlined plastic cabinet. Size: 13 x 6¾ x 6¼". Stock No. ME6-2, shipping weight 10 lbs. Net $19.95.

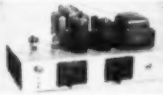
5-TUBE BROADCAST SUPERHET RADIO KIT $12.95

Model NS-5X 5 tube AC-DC superheterodyne radio kit. Has loop antenna and 2 gang condenser, with lighted slide rule dial and attractive plastic cabinet. Receives broadcast, 550 to 1650 kc. Full size dynamic speaker, matched 456 I.F.'s, automatic volume control. This is a complete radio kit. Everything furnished, including diagram, photos and tubes: 14B6, 14Q7, 14A7, 50B5 and rectifier. Shipping weight 7 lbs. Stock No. NS-5X. Net price $12.95.

Build Your Own Phono-Mike Oscillator Kit $7.95

Kit Model DE-6R. With this simple kit, you can build a 3-tube phono oscillator that also has a mike input. With broadcast over any radio, within your home, (about 75 feet) from 800 to 1500 kc. Inputs for crystal mike or crystal phono pickup. Fader control fades from mike to record. Ideal for a home P.A. system, baby listener and home entertainment. A complete kit of parts including tubes, Kit Model DE-6R. Net price, $7.95. DE-6WT, wired and tested. Net price $9.95. Crystal mike and desk stand, $4.95 extra. Concealed microphone unit, only 1" in diameter and ½" thick. Specify hidden mike when ordering. Stock No. T-601. Net $3.95 extra.

New 16 Watt Utility Amp Kit $16.95



Kit Model TM-16, push-pull wide-range 16 watt amplifier kit. Ideal for a high quality record player, as a P. A. system or recording amplifier. Matched component parts, ready punched chassis. One control fades from phono to mike. Input compensation for G.E. variable reluctance, or crystal pickup, fully shielded. Output matches 8 ohm voice coil. 100 mil power transformer. Complete with tubes, photos and diagram, 2-7C5, 7F7 and rectifier. Variable tone control. Model TM-16. Weight 10 lbs. Net $16.95.

3-SPEED RECORD PLAYER KIT $13.95

Complete record player kit to build a 3 speed player. Heavy 3 speed phono motor, universal crystal pickup, all parts and tubes to build a 7G7 type amplifier in an attractive walnut case with grill for speaker cut on top. Kit model D-3378, net price $13.95.

SELF POWERED AC Broadcast Tuner Kit. 3-Gang Tuning. Complete Kit, $12.95

A self-powered, 3-gang superhet tuner kit with R.F. stage. When wired according to our diagram will make the best possible broadcast tuner (550 to 1650 kc), for use with any amplifier. Don't class this with ordinary tuners; this has its own power transformer. This complete kit is furnished with a diagram, photos and tubes: 6SH7 R.F., 2—7E5 converter-mixer oscillator, 6ST7 I.F. detector, and 7Y4 rectifier. Connect to any audio amplifier. Ideal for use with our S-2020, TM-16 or 7X5 amplifier kits. Chassis size, 9½x4x4½" high. Shipping weight, 7 lbs. Broadcast tuner kit Model BT-38X. Net price, $12.95.

8-TUBE 22 WATT Wide Range Amp. Model 7x5 Kit Only $37.95

A complete kit, including tubes (3-7E5, 2-7F7, 2-6A3 or W.E. VT-52, plus rectifier), diagram and photos. All triode circuit makes for minimum harmonic distortion. Inputs for radio tuner any kind of phono pickup (crystal or G.E. variable reluctance) and either crystal or dynamic mike. Output transformer matches 8 ohm voice coil. Twin electronic tone controls, bass and treble with range selector switch for either juke box quality with heavy bass response or brilliant symphonic range. The best quality amplifier kit we know how to make. Has a very wide range output and heavy power transformer. Response 18 to 20,000 CPS, 8 tube all triode amplifier kit, complete with tubes. Weight 25 lbs. Net $37.95.

$19.95 BUYS THIS ALL PURPOSE 18 WATT AMP KIT

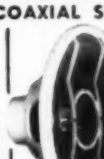
High fidelity amplifier kit, Model S-2020. Has inputs for radio tuner, any phono pickup, crystal or G.E. variable reluctance as well as crystal or dynamic mike. Controls can be mounted on the chassis or on extension leads, as pictured. Has broadcast quality shielded $10.00 value output transformer. Matches 8 ohm speaker. A complete amplifier kit with tubes; 3-7F7, 2-7C5, plus rectifier. A fine amplifier for the home music system. Model No. S-2020, weight 16 lbs. Net $19.95.

BUY YOUR WIDE RANGE COAXIAL SPEAKER AT McGEE

12" COAXIAL PM $13.95

A $32.50 retail value; 20 watt 12" coaxial PM speaker of quality used on radios of the $300 to $500 bracket. Hook up like any PM speaker. High pass filter is built on speaker. Matches 8 ohm output of radio or amplifier. Wide range response, 20 to 17,500 CPS. Model No. CU-14X, weight 10 lbs. Special sale price, $13.95, or two for $27.00.

15" COAXIAL PM $17.95



Only $17.95 buys a full 30 watt coaxial PM speaker, with built-in high pass filter. Hook to any 8 ohm output radio or amplifier. Response below 20 to above 17,500 CPS. Have a wide response. A lucky purchase makes this price possible. Full 32 oz. magnet in the woofer. 5-7 tweeter. Model 715-9. Weight 14 lbs. Sale price, $17.95, or two for $34.00.

PUSH PULL TRIODE OUTPUT TRANS. $4.95

High fidelity push-pull 2A3 to 8 ohm voice coil transformer. Wide range response. Upright mounting. Use with push-pull 2A3 or 6A3 tubes, 3,000 ohms plate to plate. No. K-94157, weight 2½ lbs. Net $4.95.

High fidelity push-pull 6V6 output transformer to 8 ohm voice coil. Upright, shielded. Matches push-pull 6V6 or any 10,000 ohm plate to 8 ohm voice coil. Weight 2½ lbs. No. K94241. $3.95.

UTAH SCOOP!

12" Utah 25 watt PM speaker, 14½ oz. Alnico V magnet, 8 ohm voice coil. A fed-hot value only 100 to sell at $12.95 each. Stock No. 1202. Shipping weight, 5 lbs. Net price, $12.95 each.

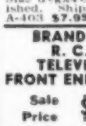
15" Utah 35 watt PM speaker. 20 oz. Alnico V magnet, 8 ohm voice coil. Only 50 of these super quality PM's to sell at $22.95 each. Stock No. 15-L8 Utah. Shipping weight, 12 lbs. Net price, $22.95 each.

MAHOGANY BAFFLE $32.95

Mahogany armchair height speaker baffle for 12 and 15" speakers, 24" high, 27" wide and 16" deep. Specify whether baffle is needed for 12 or 15" speaker. Beautiful matched mahogany, furniture quality finish. High quality, non-rattle construction. baffle No. LS-4, weight 40 lbs. Net price $32.95.

Mahogany Armchair radio-phonograph cabinet with blank panels, 24" high, 27" long and 16½" wide. Will hold record changer up to 14" square; radio compartment 14" long, 8" high and 16" deep. Baffle cut for 12" speaker. Top quality furniture construction. Weight 40 lbs. Net price $34.95.

McGEE'S SUPER HIGH FIDELITY OUTPUT TRANS. 20-20,000 CPS. $7.95



Best Value In U.S.A.

Model A-403 High fidelity output transformer. Why pay $20 or $30 for an output, when our A-403 is available at $7.95? Impedances: 6600 ohms plate to plate, (for PP 6L6 or 6V6); 10% feedback winding; 4-8-15-250 and 500 ohm secondary. Housed in a potted case. Net weight 6 lbs. Recommended for all amplifiers up to 34 watts. Size 3⅞x4½x3". Suggested diagram furnished. Shipping weight 8 lbs. Net price A-403 $7.95.

G.E. RECORD PLAYER ATTACHMENTS SALE PRICE $6.95

General Elec. 78 RPM Record Players to attach to any radio or amplifier. Heavy duty motor and standard crystal phono pick-up. Volume control and off-on switch. Shpg. weight 8 lbs. (No pre-amp necessary.) 78 RPM Model, Stock No. GE-78, $6.95.

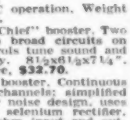
BRAND NEW R. C. A. TELEVISION FRONT END-TUNERS Sale Price $14.95

A fortunate purchase from a T.V. set manufacturer makes this value possible. RCA 13 channel, completely wired, tested and aligned T.V. tuner. A 13 channel selector switch and fine frequency control. Converter output transformer is attached for direct coupling to video and sound I.F. circuit. 33½" shaft length. Original dealer's cost on this item was over $30.00. McGee offers them to you brand new (they have been rewired to or in sets) for only $14.95, less tubes. (3 6J6 tubes required). Shipping weight 2 lbs. Stock No. RCA-13P. less 3 6J6 tubes. Net $14.95, two for $27.95.

5-ELEMENT YAGIS $9.80

Yagi TV aerial. Top quality. We offer you pre-assembled, 5-element Yagi antennas, cut to the channel that you need. Maximum gain folded dipoles with bisecting element, give perfect 300 ohm match. This antenna is 2nd to none. Low channel 2 and 3, net price, $10.45; channels 4, 5, and 6, net price, $9.80 each. Specify, when ordering, which channel you want. Packed 2 to a carton. Minimum order, 2 antennas. Phone us for quantity prices. We have plenty of 300 ohm lead in stock. Phone Victor 9045. Antennas priced less mast and lead.

T.V. BOOSTER REGENCY $19.10



Regency DB-410 television booster. A real engineered unit, small and compact. 8 tube tuned, using 1—6J6 tube as neutralized push-pull amplifier. Dollar for dollar, your best booster buy. 55x5 4¾". For 110 volt AC operation. Weight 6 lbs. Net price $19.10.

Astatic AT-1, "Channel-Chief" booster. Two tuned circuits and two broad circuits on all channels. Dual controls tune sound and picture independently. 8½x6½x7¼". Weight 6 lbs. Net price, $32.70.

Astatic BT-1 television booster. Continuous variable tuning on all channels; simplified single knob tuning; low noise design, uses single 6AK5 tube and selenium rectifier. For either 72 or 300 ohm input and output. Woodgrain metal cabinet. Weight 4 lbs. Net $19.10.

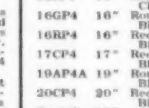
Koenig Tele-Beamer Antenna Rotator. Most dependable made today. Any weight antenna from ¾ to 2" mast. Takes winds up to 80 mph. Indicator shows exact position every instant. A precision instrument completely weatherproof. Electric stops, machine-cut steel and bakelite gears. Uses TWO heavy motors. Net price, $32.30.

T.V. AND RECEIVING TUBES

This is a sample of our tube offering. Most types are available at 50% off standard list, on orders of reasonable quantity.

6Z4	$0.93	1B3	$1.32		
9003	1.00	1R5	1.00		
1X2A	1.32	1T4	1.00		
5Y3GT	.63	3S4	1.00		
14Q7	1.10	6W4	.80		
6K6GT	.83				

GOOD QUALITY PICTURE TUBES! EVERY TUBE GUARANTEED 90 DAYS



Look over these picture tube prices and you will see that for set replacement, conversion and builders, McGee offers you more for your money. Check our price before you buy a picture tube. NOTE: 10MP4 replaces 10BP4 without any circuit changes.

			Net Each Price	3 Lot Price
10MP4	10"	Perfect sub for 10BP4	$17.95	$17.00
12LP4	12"	Round, Glass, Clear	17.95	17.00
14CP	14"	Rectangular, Blackface	25.95	24.95
15DP4	15"	Round, Glass, Clear	34.95	32.95
16JP4	16"	Round, Glass, Clear	24.95	22.95
16GP4	16"	Round Metal, Blackface	27.95	25.95
16RP4	16"	Rectangular, Blackface	29.95	27.95
17CP4	17"	Rectangular, Blackface	29.95	27.95
19AP4A	19"	Round Metal, Blackface	59.95	none
20CP4	20"	Rectangular, Blackface	59.95	none

Scoop! 16" rectangular mask—gold color finished plastic. $2.95 each.

70° deflection yoke for rectangular tubes, $3.95.

14 KV flyback transformers, $3.95. When ordered with picture tube.

BUY YOUR TELEVISION MATERIAL AT McGEE

20 MATCHED VIDEO COIL KIT $7.95

20 matched TV video and sound I.F. coils. Intended for use with the RCA circuit. You get 6 peaking coils, 4—25.75 mc picture I.F.'s, 2—21.25 mc sound I.F.'s, discriminator and converter coil and 5 filament chokes. Stock No. 205-XX, weight 3 lbs. Net price, $7.95. $6.95 if purchased with a Sarkes-Tarzian TV tuner; all coils identified.

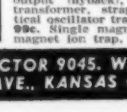
SARKES-TARZIAN TV TUNER $9.95

Sarkes-Tarzian 13-channel television front end tuner. Factory-wired. Rotary switch type, popular today on many TV sets. Also good for building purposes. 6C4 oscillator, 6BH6 RF and 6AG5 mixer. Output of tuner feeds your converter coil, I.F.'s, etc. Stock No. T-5, weight 3 lbs., has converter coil built on. Our 205-XX video coil kit, $6.95 extra, when ordered with tuner.

BRAND NEW GENERAL INST. TELEVISION FRONT END-TUNERS Sale Price $7.95

All completely wired, brand new and prealigned, 13 channel selector incorporating fixed inductance and variable capacitance. Converter output transformer is attached to be coupled direct to separate sound and video I.F.'s. 3 6J6 tubes are required. Shaft length 2¼". Built in fine frequency control. Original factory cost over $20.00. Weight 4 lbs. Stock No. GI-13P, less tubes. Net price $7.95.

T.V. FLYBACKS YOKES, ETC.



52 degree deflection yokes, for 10, 12 and 16" round tubes, $2.95 each. 70 degree deflection yokes for 14, 16, 17 and 19" rectangular tubes, $3.49 each.

New small horizontal output (flyback) 14000 volt, $3.95. Philco 12 or 16" horizontal output (flyback), $3.48. Vertical output transformer, strap mounting, $1.95. Vertical oscillator transformer, strap mounting, 99c. Single magnet ion trap, 49c. Double magnet ion trap, 89c.

McGEE RADIO COMPANY

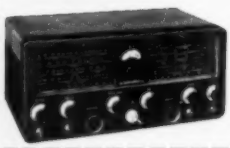
Prices F.O.B. K.C. Send 25% Deposit with Order, Balance Sent C.O.D. With Parcel Post Orders, Include Postage

TELEPHONE VICTOR 9045. WRITE FOR FLYER
1422 GRAND AVE., KANSAS CITY, MISSOURI

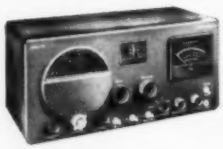
HENRY HAS THE NEW

hallicrafters

MODEL SX-71 NOW!



This new type of receiver—the first of its kind on the market—has extra sensitivity, selectivity, and definitely superior image rejection. Continuous AM reception from 538 kc to 35 Mc, and 46 to 56 Mc. One RF, 2 conversion, and 3 IF stages. 105-125 volts AC. 11 tubes plus voltage regulator and rectifier. Only $199.50. (R-46 matching speaker only $19.95)



NEW DUAL-CONVERSION RECEIVER HALLICRAFTERS Model S-76

Note these features: Dual conversion (1650 Kc and 50 Kc)—more usable selectivity than the best crystal. Giant 4-in. "S" Meter—calibrated in microvolts and "S" units. Four bands 538-1580 Kc, 1720 Kc to 32 Mc. Calibrated electrical bandspread. 5 position selectivity. Sensitivity 2 microvolts or better with 5 watt output. 9 tubes plus regulator, rectifier. $169.50.

I have a complete stock of Hallicrafters receivers and transmitters. I'll make you the best deal on a trade-in for your communications receiver. I give you prompt delivery, and 90-day FREE service. Nobody can beat Bob Henry on a trade-in, and I offer you the world's lowest credit terms. Write, wire, phone, or visit either store today for the best deal. Export orders solicited.

Bob Henry
W9ARA

Butler 2, Missouri

HENRY RADIO STORES

11240 Olympic Blvd
LOS ANGELES 25
CALIF.

"WORLD'S LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"

FREE! Just For Examining

COYNE'S New 5-Volume Set

APPLIED PRACTICAL RADIO-TELEVISION

Get this Book of TV PICTURE PATTERNS & WAVE FORMS . . . FREE. Gives you dozens of actual TV Test Patterns and wave forms—tells how to use them to shoot trouble and repair TV sets quicker . . . easier. Money-making short cuts that help you get ahead in Television. It's yours FREE!

Complete . . . Practical . . . Up-to-Date!

This book is our gift to you for examining Coyne's brand new 5-volume set APPLIED PRACTICAL RADIO-TELEVISION. Here is the most completely up-to-date set of reference books in America! 1500 easy-to-understand pages; 1000 illustrations. Covers all phases of radio and television. Tells you how to install, service trouble shoot, align all types of radio and television sets. "Break-down" photos help you understand quicker.

Sensational Free Book Offer Send No Money!

Mail coupon now to get this great new 5 volume set and the FREE Book of Picture Patterns. Use the set 7 days. If you keep the set, pay just $3.00 after 7 days and $3.00 a month until $16.50 plus postage is paid. (Cash price $15.00.) If not 100% satisfied with set send it back and owe us nothing. EITHER WAY THE BOOK ON TV PICTURE PATTERNS IS YOURS FREE. Coupon is just a request to see set and get Free book of picture patterns. This offer is limited. ACT NOW!

FREE on 7 DAYS TRIAL

MAIL COUPON NOW!

COYNE ELECTRICAL & TELEVISION-RADIO SCHOOL
500 S. Paulina St., Dept. 41-T3, Chicago 12, Ill.

Rush "APPLIED PRACTICAL RADIO-TELEVISION" on 7 days' FREE TRIAL, per offer above.

NAME ..... Age .....

Address .....

City ..... Zone .... State .....

Where Employed .....

☐ Check here if you want set sent C.O.D. You pay postman $15.00 plus C.O.D. postage. Same money-back guarantee of satisfaction.

PHOTOCON SALES

Mail Order Address
1060-2 N. Allen Ave.
Pasadena 7, Calif.
SYcamore 4-7156
RYan 1-8271

Retail Sales Store
1240 East Colorado St.
Pasadena 1, Calif.
SYcamore 6-7217

April Specials

Write for Our Latest Sales Bulletins

HS-23 Hi Imp. Headset with plug and ear cushions. Each ..... NEW $3.95
HS-33 Headset. Low Imp. with plug and ear cushions ..... NEW 4.50

TELETYPE PAPER—8½" wide by 31⅛" diameter—White—Single . . . $0.50 per roll

Weston Tachometer Generator, Model 724, Type C ..... GOOD USED $12.95
Weston Electrical Tachometer, Model 545, for use with 724 Generator. Speed 0-2000 R.P.M. Ratio 2:1 ..... NEW 14.50

We have thousands of Tubes, High Voltage Oil Capacitors, Mica Capacitors, Transformers, and Miscellaneous Items. Please send us your requirements.

FL-8 Range Filter ..... NEW $1.95
Variac—General Radio Type 50A, 115 Volt, 60 Cycles—5KVA . . EXC. COND. 95.00
APN-1 Altimeter Indicator, basic movement 0-1 ma. 5 ma. shunt 270° dial. An excellent movement for constructing your own meters. . . . BRAND NEW 1.95

PLUGS

PLQ-171, PL-172, PLQ-60, PLQ-63, PL-147, PL-148, PL-151, PL-152, PL-153, PL-154, PL-156, PLQ-103. Plugs for ARC-1, ARC-3, ARC-5, BC-375, SCR-522, BC-348, GP-6, GP-7, LM Frequency Meters and many others.

IE-19A Test Set for SCR-522 complete with manual ..... NEW $325.00
LM Frequency Meter with cal. book, crystal, tubes ..... EXCELLENT 79.50
BC-221 Frequency Meter with calibration book, crystal, tubes—EXCELLENT 79.50

BC-348, ATC, T47/ART-13, T47A/ART-13, MN26C, BC-342, BC-312, BC-224, RT18/-ARC-1, R5/ARN7, SCR-522, SCR-625, BC-375, BC-222, BC-684, BC-464, RA10, and many others. Prices on request.

We will buy new or clean, used ARC-1, ARC-3, ART-13, BC-348 original condition or converted to 115V. A.C., BC-312, BC-342, Test Equipment, etc. All letters will be answered promptly. Please list equipment, condition, and lowest price.

TERMS: Prices f.o.b. Pasadena, Cal. 25% on all C.O.D. orders. Californians add 3% Sales Tax.

Splitting Pads

(*Continued from page* 56)

data is substituted in this formula, then:—

$$Power\ loss = 20\ log\ \frac{10}{5} = 20\ log\ 2 =$$

6.02 decibel

Delta to Star Conversion

Another connection called the "star" connection has the advantage over the "delta" connection of being a simpler combination, and the delta circuit shown in Figs. 1D and 1E may be converted to the star or "Y" connection shown in Fig. 1F. Now if these circuits are to be equivalent, then the resistance between points *AB*, *BC*, and *CA* in Figs. 1E and 1F must be similar. At a glance it may be clear that in Fig. 1F the resistance from *A* to *O* will equal 600 ohms, the resistance *O* to *B* will also equal 600 ohms, making *A* to *B* equal to 1200 ohms as required. It may be mathematically proved, however, that:—

$$R_A = \frac{R_1 R_3}{R_1 + R_2 + R_3}$$

$$R_B = \frac{R_1 R_2}{R_1 + R_2 + R_3}$$

and

$$R_C = \frac{R_2 R_3}{R_1 + R_2 + R_3}$$

For example, to convert the delta formation in Fig. 1D to an equivalent star or "Y" formation, then:—

$$R_A = \frac{1800 \times 1800}{1800 + 1800 + 1800}$$

$$= 600 \text{ ohms.}$$

and likewise, R_B and R_C will be equal to 600 ohms respectively. The equivalent star or "Y" connection would be then as shown in Fig. 1G.

Practical Application

This type of network has practical application in circuits such as the one shown in Fig. 1L where three balanced channels are connected together via the star connection. This circuit enables two sources of alternating current to be fed into one channel or one source of alternating current to be split into two channels.

Another practical application of the star pad is shown in Fig. 1M where the output from an amplifier may be:—

(a) Disconnected from both channels,

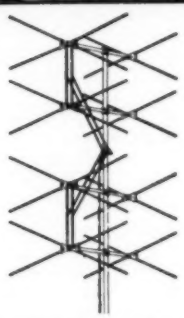
(b) Connected to both channels, or

(c) Connected to either channel.

This arrangement may be also used to mix the output of two amplifiers into the one channel.

There are many and varied applications of this simple circuit arrangement but it must be remembered that the loss of 6.02 decibel is a disadvantage. The use of standard 600 ohm non-inductively wound bobbins considerably simplifies the construction of

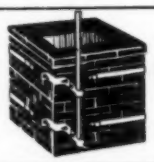
TESCO TESCO TESCO TES
TESCO TESCO TESCO



FOUR BAY CONICAL

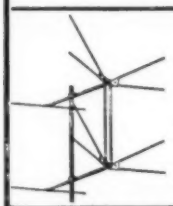
Quantity	No. 1226 $\frac{3}{16}$" seamless aluminum tube elements Price Each	No. 1231 $\frac{3}{16}$" butt seam aluminum tube elements Price Each	No. 1234 $\frac{1}{2}$" butt seam aluminum tube elements Price Each
1	**$23.87**	**$20.85**	**$24.86**
6	**22.28**	**19.53**	**23.21**
12	**19.25**	**16.83**	**20.08**

NO. 1905 MAST SNAP-ON FOR $1\frac{1}{4}$" MAST
1, **.06**, 100, **.04**, 1,000, **.036** ea.



NO. 1860 CHIMNEY MOUNT

1	**$1.92**
12	**1.54**
48	**1.31**
96	**1.20**



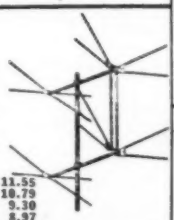
SINGLE REFLECTOR CONICALS

No. 1259 Single Bay $\frac{3}{16}$" elements. **$3.90**
No. 1256 Single Bay $\frac{1}{2}$" elements **4.69**
No. 1254 Double Bay $\frac{3}{16}$" elements **8.15**
No. 1258 Double Bay $\frac{1}{2}$" elements **9.65**
No. 1257 Four Bay $\frac{3}{16}$" elements **18.15**
No. 1253 Four Bay $\frac{1}{2}$" elements **20.99**

DOUBLE BAY CONICAL

No. 1214 $\frac{3}{16}$" seamless aluminum tube elements.
No. 1230 $\frac{3}{16}$" butt seam aluminum tube elements.
No. 1233 $\frac{1}{2}$" butt seam aluminum tube elements.

Quantity			
1	**11.29**	**9.56**	**11.55**
6	**10.54**	**8.92**	**10.79**
24	**9.08**	**7.72**	**9.30**
18 bulk pack	**8.75**	**7.39**	**8.97**



FIVE ELEMENT TELEVISION YAGI

No. 1302 to 1313 Order as follows: 1302 for Channel 2, 1303 for Channel 3 etc.

Quantity	1	3	10	24
1302 to 1306	**13.62**	**12.71**	**12.10**	**10.75**
1307 to 1313	**5.45**	**5.08**	**4.72**	**4.30**

ECONOMY FIVE ELEMENT TV YAGI
(Butt seam elements)

Quantity	1	6	12
2002-2006	**10.62**	**9.90**	**8.60**
2007-2013	**3.93**	**3.70**	**3.10**

SINGLE BAY CONICAL

Quantity	No. 1213 $\frac{3}{16}$" seamless aluminum tube elements Price each	No. 1229 $\frac{3}{16}$" butt seam aluminum tube elements Price each	No. 1232 $\frac{1}{2}$" butt seam aluminum tube elements Price each
1	**$5.45**	**$4.58**	**$5.57**
6	**5.08**	**4.28**	**5.21**
24	**4.38**	**3.69**	**4.51**
36 Bulk Pkd.	**4.05**	**3.36**	**4.18**

NO. 1219 FOLDED-HI STRAIGHT-LO ALL CHANNEL ANTENNA

1	**$4.92**
6	**4.60**
24	**3.85**

NO. 1244 FOLDED-HI STRAIGHT-LO BUTT SEAM ELEMENTS

1	**$4.26**
6	**3.98**
24	**3.47**

Check These Low Prices

No.	Description	Quantities of	Price
1221	Hi Channel Adapter	24	**1.50** ea.
1222	Hi Channel Conical	24	**2.26** ea.
1225	Hi Channel F.D. stacked array	24	**2.75** ea.
1227	4 Bay Hi Channel conical	24	**9.89** ea.
1228	Straight Low and Ref.	12	**2.88** ea.
1238	F.D. & Ref. Hi Channel	24	**1.51** ea.
1240	Single section conical	24	**1.67** ea.
1246	Folded Low and Ref.	12	**3.47** ea.
2109	$\frac{1}{4}$" carbide drill	1	**1.20** ea.
2110	$\frac{5}{16}$" carbide drill	1	**1.43** ea.
2111	$\frac{1}{2}$" carbide drill	1	**1.80** ea.
2112	$2\frac{1}{2}$" lead anchor bolts	100	**5.09** c.
1801	$3\frac{1}{2}$" turnbuckle	12	for **1.00**
1802	$4\frac{1}{2}$" turnbuckle	12	for **1.06**
1803	5" turnbuckle	12	for **1.58**
1804	$7\frac{1}{2}$" turnbuckle	12	for **3.95**
1886	12" wallbracket Aluminum	6	**1.89** pr.
1889	$\frac{1}{4}$"x$1\frac{1}{2}$" lag bolts	10	for **.35**
1890	$\frac{1}{4}$"x2" lag bolts	10	for **.40**
1891	$\frac{1}{4}$"x3" lag bolts	10	for **.45**
1896	4/20 steel guy wire	**.55**	per 100 ft.
1911	Straight High and Ref. Antennas below have $\frac{3}{16}$" butt seam elements	12	**1.49** ea.
1245	Straight Low and Ref.	12	**2.42** ea.
1247	Folded low and Ref.	12	**2.95** ea.
1248	Hi Channel F.D. & Ref.	12	**1.27** ea.

NO. 2113 INDOOR ANTENNA

1	**$2.48**
6	**2.31**
24	**2.06**

TELEVISION SUPPLY CO.

Box 213 Gracie Sq. Station • New York, N. Y.

MINIMUM ORDER $5.00 • PRICES F. O. B. NEW YORK
PARCEL POST ORDERS MUST INCLUDE POSTAGE
25% DEPOSIT REQUIRED ON ALL C. O. D. ORDERS
PROMPT SERVICE

IMMEDIATE DELIVERY
ON ALL ORDERS

ORDERS RECEIVED WITHOUT POSTAGE WILL BE SHIPPED VIA RAILWAY EXPRESS COLLECT

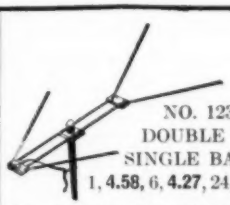
ELECTRO-GALVANIZED STEEL MASTS

Quantity	1	6	12	24
No. 1861 5 ft.	**.96**	**.85**	**.82**	**.77**
No. 1862 10 ft.	**1.80**	**1.62**	**1.52**	**1.45**

NO. 1872 DRIVE-IN STANDOFF INSULATOR
1, **.03** 100, **.0275** 250, **.025** 1000, **.0225** ea.

WOOD SCREWEYE STANDOFF INSULATOR

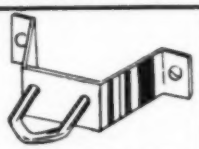
Quantity	1	100	250	1000
No. 1870	$3\frac{1}{2}$"	**.03**	**.0275**	**.025**	**.0225**
No. 1871	$7\frac{1}{2}$"	**.05**	**.045**	.....	**.035**



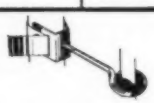
NO. 1236 DOUBLE "V" SINGLE BAY
1, **4.58**, 6, **4.27**, 24, **3.75**

No. 1237 Double "V" Double Bay, 1, **9.15**, 6, **8.55**, 12, **7.50**

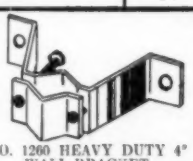
NO. 1215 FOLDED-HI FOLDED-LO ALL CHANNEL ANTENNA
1, **$5.37**, 6, **$4.98** 24, **$4.24**.
NO. 1243 FOLDED-HI FOLDED-LO BUTT SEAM ELEMENTS
1, **$4.75** 6, **$4.43** 24, **$3.87**.



NO. 1887 7" HEAVY DUTY WALL BRACKET
1, **$1.10** 6, **$1.00** 24, **$0.90** pr.



NO. 1873 $3\frac{1}{2}$" MAST STAND-OFF INSULATOR
1, **.08** 50, **.07** 100, **.065** 1,000, **.06** each.



NO. 1260 HEAVY DUTY 4" WALL BRACKET

1	**$ .63**	24	**$.51**
6	**.59**	100	**.45**

TELEVISION SUPPLY CO.

Box 213 Gracie Sq. Station • New York, N. Y.

Please put my name on your mailing list to receive the New 1951 Catalog.

NAME.....

STREET.....

CITY.....ZONE.....STATE.....

SEND FOR LITERATURE **FOR "LARGE QUANTITY" PRICES CONTACT US!**

Profitable Careers in Radio
TELEVISION ELECTRONICS

CREI RESIDENCE SCHOOL trains you for vital industry—qualifies you for better jobs in the armed services.

• Your success in this highly technical field depends on how much you know and how well you apply it. Whether you want a career in the electronics industry, where critical shortages of trained men exist, or plan to enter military service, CREI Residence School training is your key to a **better** job at **higher** pay.

Recognized as outstanding by engineers, educators, the Armed Services, and important firms like RCA-Victor, Bendix, and United Air Lines (whose technicians have received CREI training at company expense) your course can be completed in approx. 20 months.

ILLUSTRATED CATALOG FREE

Send for the new descriptive catalog, with survey of opportunities, and details of course and school. New classes start twice a month. Act now!

VETERANS: Training available under G.I. Bill. July 25, 1951 is deadline for most veterans. Don't delay!

CAPITOL RADIO ENGINEERING INSTITUTE
An Accredited Technical Institute Founded in 1927
Dept. 134C, 16th & Park Rd., N. W., Wash. 10, D. C.

Please send FREE Residence School Catalog 134C

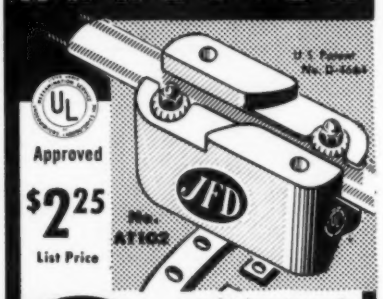
Name_____

Street_____

City_____ Zone____ State_____

☐ Veteran ☐ Non-Veteran Age_____
☐ Send details about Home Study Courses.

THE WORLD'S LEADING TWIN LEAD TELEVISION LIGHTNING ARRESTER



UL Approved
$2.25 List Price
completely waterproof

JFD SAFE TV GUARD

Protects television sets against lightning and static charges. Simple to install everywhere and anywhere . . . no stripping, cutting or spreading of wires. More than 500,000 in use today!

See your jobber or write to —

JFD MANUFACTURING CO., INC.
6305-D 16th Ave., Brooklyn 4, New York
FIRST in Television Antennas and Accessories

AEROVOX
Twist Prong Base
ELECTROLYTICS

GREATER SELECTION OF VOLTAGE, CAPACITANCE AND SECTION COMBINATIONS . . .

• Don't improvise! With Aerovox Type AFH (85° C. for TV) twist-prong base electrolytics you can select just that combination of voltages, capacitances and sections required. In singles, duals, triples and quads. Over 200 different numbers to choose from.

Prongs extend down through mounting washer and are twisted to hold capacitor in place. All connections to terminals except the cathode attached to container. Metal or fiber washers supplied for grounded or insulated can.

• • • •

Ask your jobber for Aerovox Type AF electrolytics. Consult Aerovox listings for the exact combination you need.

CAPACITORS • VIBRATORS • TEST INSTRUMENTS

AEROVOX capacitors
For Radio-Electronic and Industrial Applications

AEROVOX CORPORATION, NEW BEDFORD, MASS., U. S. A. • Sales Offices in All Principal Cities
Export: 41 E. 42nd St., New York 17, N. Y. • Cable: AEROCAP, N. Y. • In Canada: AEROVOX CANADA LTD., Hamilton, Ont.

the pads and carbon resistors of suitable value may also be used.

Matching with Series Resistors

Another method of matching is by the use of series resistances in each branch of individual circuits as shown in Fig. 1J. In this circuit, channels 2 and 3 are assumed to be terminated in their correct impedances, and thus channel 1 must look like 600 ohms. Now the circuit shown in Fig. 1J may be simplified to that shown in Fig. 1I, and Fig. 1I, in turn, simplified to that shown in Fig. 1H. The joint resistance of two equal resistances in parallel may be found by dividing the resistance of one by the number of resistances connected in parallel, and in the case of the two equal resistances shown in Fig. 1H, the joint resistance will be:—

$$\frac{(x+600)}{2}$$

The impedance of the network shown in Fig. 1H must match the impedance of channel 1 (that is, 600 ohms) and thus:—

$$x+\frac{x+600}{2}=600$$

therefore $x = 200$ ohms.

This value of 200 ohms represents the sum of the values of both resistors in each branch of the network and thus each resistor will be:—

$$\frac{x}{2} \text{ or } \frac{200}{2} \text{ or } 100 \text{ ohms}$$

The completed circuit will then be as shown in Fig. 1K. This circuit has an approximate loss of 4.44 decibels in each channel which, however, is not a very serious disadvantage. The same circuit arrangements may be used with this method as shown in the previous circuits, and, while not as simple as these, it is nevertheless simpler than the standard matching pad. Another feature of the split pad is that the pad does not affect the frequency response, provided that non-inductive resistors are used.

The author wishes to thank Mr. Charles Smith for his assistance in the mathematical development of various equations.

—30—

PARTS and TUBES

TUBES—Radio and TV

1C5GT	$1.32	6AB7	$1.92	6K7GT	$0.99	7B6	$1.08	12SH7GT	$1.32	35Z5GT	$0.90
1C6	1.92	6AC5GT	1.74	6K8	1.44	7B7	1.08	12SJ7	1.08	35Z6G	1.59
1C7G	1.92	6AC7	2.25	6K8GT	1.44	7B8	1.08	12SJ7GT	1.08	35	1.59
1DSGP	2.34	6AG5	1.59	6L5G	1.59	7C4	1.92	12SK7	1.08	39/44	1.59
1D7G	1.92	6AG7	1.92	6L6	2.12	7C5	1.08	12SK7GT	1.20	41	.99
1D8GT	2.34	6AH6	2.95	6L6G	2.12	7C6	1.08	12SL7GT	1.44	42	.99
1F4	1.59	6AK5	2.34	6L6GA	2.12	7C7	1.08	12SN7GT	1.32	43	.99
1F5G	1.59	6AK6	1.44	6N6G	1.74	7E5	1.59	12SQ7	.90	45	.99
1G4GT	1.59	6AL5	1.20	6P5GT	1.44	7E6	1.59	12SQ7GT	.99	45Z5GT	1.08
1G6GT	1.59	6AL7GT	1.59	6Q7	1.20	7E7	1.59	12SR7	1.32	46	1.59
1H6G	1.92	6AQ5	1.20	6Q7GT	1.08	7F7	1.32	12SR7GT	1.32	47	1.44
1J5G	1.59	6AQ6	1.08	6R7GT	1.59	7F8	1.59	12Z3	1.59	50	2.34
1J6G	1.92	6AQ7GT	1.44	6S4	1.59	7G7	1.59	14A7	1.32	50A5	1.32
1J6GT	1.92	6AR5	.99	6S7GT	1.92	7H7	1.20	14AF7	1.44	50B5	1.20
1LA4	1.59	6AS5	1.20	6S8GT	1.59	7J7	1.59	14B6	1.32	50C5	1.20
1LC5	1.59	6AT6	.90	6SA7	1.59	7K7	1.59	14B8	1.32	50C6G	1.74
1N5GT	1.20	6AU5GT	1.59	6SA7GT	1.20	7L7	1.59	14E6	1.32	50L6GT	.99
1PSGT	1.59	6AU6	1.20	6SC7	1.20	7N7	1.32	14E7	1.59	50X6	1.32
1Q5GT	1.20	6AV6	.90	6SD7GT	1.74	7Q7	1.08	14F7	1.32	50Y6GT	1.08
1R5	1.20	6AX5GT	.81	6SF5	.99	7R7	1.32	14F8	1.32	55	.90
1S5	1.08	6B4G	1.92	6SF5GT	1.08	7S7	1.59	14H7	1.44	56	1.08
1T4	1.20	6B5	1.92	6SH7	1.20	7V7	1.20	14J7	1.59	57	1.08
1T5GT	1.59	6B8GT	1.92	6SG7	1.20	7W7	1.59	14N7	1.59	58	1.08
1U4	1.20	6BA6	1.08	6SH7	1.32	7X7	1.59	14Q7	1.32	59	2.12
1U5	1.08	6BA7	1.44	6SH7GT	1.32	7Y4	1.08	14X7	1.59	70L7GT	2.34
1V	1.59	6BC5	1.20	6SJ7	1.08	7Z4	1.08	14Y4	1.44	71A	1.20
1X2A	1.59	6BC7	1.32	6SJ7GT	1.08	10	2.34	19BG6G	3.60	75	.99
2A3	1.92	6BE6	1.08	6SK7GT	1.20	12A	.81	19T8	2.25	76	.99
2A5	1.32	6BF5	1.32	6SL7GT	1.44	12AE6	1.74	20	1.74	77	.99
2A7	1.59	6BF6	.99	6SN7GT	1.32	12AF7	1.92	22	1.92	78	.99
2K5	1.59	6BG6G	2.88	6SQ7	.90	12A8GT	1.20	24A	1.32	79	1.59
2A5GT	1.59	6BH6	1.20	6SQ7GT	.99	12AT6	1.08	25A7GT	1.80	80	.81
3B7/1291	1.59	6BJ6	1.20	6SR7GT	1.08	12AT7	1.74	25AC5GT	1.74	81	2.34
3C6	1.92	6BN6	1.92	6SS7	1.08	12AU6	1.20	25B6GT	1.92	82	1.59
3E6	1.59	6C4	.99	6ST7G	1.08	12AU7	1.08	25C6G	1.74	83	1.59
3LF4	1.59	6C5GT	.99	6T8	1.92	12AV6	.90	25D8	2.34	84	1.08
3Q4	1.32	6C6	1.20	6U5	1.20	12AV7	1.52	25L6GT	1.08	85	1.32
3Q5GT	1.44	6CB6	1.20	6U8GT	1.20	12AX7	1.44	25W4GT	1.20	89Y	1.32
3S4	1.20	6CD6G	3.60	6U7G	1.44	12BA6	1.08	25Y5	1.74	117L7	2.34
3V4	1.20	6D6	1.20	6V6GT	1.20	12BA7	1.44	25Z5	1.59	117N7GT	2.34
5T4	2.34	6D8G	1.92	6V7G	1.08	12BE6	1.08	25Z6GT	.99	117P7GT	2.34
5U4G	.99	6E5GT	.99	6W4GT	1.08	12BH7	1.85	26	1.08	117Z3	1.80
5V4G	1.44	6F6GT	.99	6W6GT	1.08	12F5GT	1.08	27	.90	117Z6GT	1.44
5W4	.99	6F8G	1.92	6X4	.90	12H6	1.08	30	1.20	VR150	1.80
5W4GT	.99	6G6G	1.59	6X5GT	.90	12J5GT	.90	31	1.59	2B2B	.30
5X4G	1.08	6H4GT	1.59	6Y6G	1.44	12K7GT	.99	32L7GT	1.52	483	.30
5Y3GT	.75	6H6	.99	6Y7G	1.92	12Q7GT	1.08	33	1.92	199V	.30
5Y4G	.90	6H6GT	.99	7A4	1.20	12SA7	1.20	35/51	1.20	807	1.50
5Z3	1.08	6J5GT	.90	7A5	1.20	12SA7GT	1.20	35B5	1.20	813	6.75
5Z4	1.59	6J6	2.00	7A6	1.08	12SC7	1.32	35C5	1.20	1619	.25
6A3	1.92	6J7G	1.20	7A7	1.08	12SF5GT	1.20	35L6GT	1.08	1622	1.75
6A4	1.92	6J8G	1.59	7A8	1.08	12SF5GT	1.20	35W4	.75	2050	1.75
6A7	1.20	6K5GT	1.44	7AF7	1.08	12SF7	1.20	35Y4	1.08	2051	1.25
6A8GT	1.20	6K6GT	.99	7B4	1.08	12SG7	1.20	35Z3	1.08	7193	.18
6AB4	1.20	6K7G	.99	7B5	1.08	12SH7	1.32	35Z4GT	.90	VT 52	.30

OZ4	$0.99
OZ4G	.99
1A5GT	1.08
1A6	1.92
1A7GT	1.20
1B3GT	1.59

INDIVIDUALLY BOXED—STANDARD FACTORY GUARANTEE.

ORDER from "PREMIER"
Your reliable source since 1926

SPEAKERS

Very Best Quality—NATIONAL BRANDS—Individually Packed

	10 or more each	Price Each
3"	$1.14	$1.26
4"	1.55	1.65
5"	1.69	1.79
8"	2.94	3.23
10"	4.74	5.10
12"	5.94	6.54

5 x 7 ... $2.25 ea. 6 x 9 ... $3.25 ea.

5" PM with 50L6 o. p. Xformer ... $1.99

SPECIAL—6" PM Speakers, big Alnico 5 magnet
In lots of 10 ... each $1.55
individual ... 1.67

World's Best Indoor TV Antenna

A beautiful antenna which is the ultimate in reception, highest signal gain, nothing to adjust.
List price $9.95 ... Each **$4.78**

TV Antennas:

Twin V Antenna with 8 ft. mast ... $6.95
In-line Antenna ... $8.95
All band YAGI with 8 ft. mast can be used in-line or hi-low **$10.74**

WORLD'S BEST DELUXE CONICAL $10.74
with 8-ft. mast and heavy cast fittings.

100 ft. of twin lead with any TV antenna ... $2.39
100 ft. of twin lead .. $3.45 1000 ft. .. $32.50

VIBRATORS

Standard small size, 2½" in height (the popular small size), bright and shiny
Stock up while they last, all 4-prong Universal Vibrators. **$1.59 each**

OUTPUT TRANSFORMERS

STANDARD REPLACEMENT

For 50L6, 35L6, 50A5, 35A5, 117L7 ... **74c ea.**
For 6V6, 6F6, 3Q5, 3Q4, 3S4, 3V4, 41, 42, 6K6, 2A3, 45, 6L6 **79c ea.**

UNIVERSAL OUTPUT TRANSFORMERS
SPECIAL
Up to 12 watts to any speaker (while they last) ... ea. **$1.18**

VOLUME CONTROLS

VERY BEST BRANDS	10 or more Each	Price Each
½ meg. or 1 meg. or 1/10 meg. with switch—long shaft	52c	59c
2 meg. for battery sets—switch, long shaft	52c	59c
½ meg., 1 meg., 1/10 meg. or 2 meg., long shaft, less switch	24c	28c
1000 ohm	19c	23c
5000 ohm	19c	23c
½ meg. with 6" shaft	59c	71c

Special on #47, #44 and #51 $4.74
100 PILOT LIGHTS . . .
Box of 10 ... 59c

PILOT LIGHTS #40 #41 #46 $5.88
100 Bulbs
Box of 10 Bulbs ... 65c

TV Discriminator Transformers ... ea. .83

TV Screen Filters with suction cups—best quality INDIVIDUALLY BOXED for highest re-sale value. 10" ... 1.40 12" ... 2.34

OCTAL SOCKETS ... 10 for 59c
7-PIN MINIATURE SOCKETS ... 10 for 59c
9-Pin Miniature Sockets ... 10 for 59c
Loctal Sockets ... 10 for 59c

TV PICTURE TUBES

10BP4	$10.95	16RP4	$29.95
12LP4	$19.95	16TP4	$29.95
14BP4	$22.95	17BP4A	$31.95

FILTER CONDENSERS

Very best brands. Fresh stock

450 Working Volts

8—450 V	ea. 29c
10—450 V	ea. 35c
20—450 V	ea. 47c
30—450 V	ea. 59c
30—450 V w/ 20-20—25 V	ea. 35c
10-10—450 V	ea. 52c
20-20—450 V	ea. 59c
10-10-10-20—450V-150-25 V	ea. 59c
30-30—400 V-350 V	ea. 47c
30-30-25—400 V-25 V	ea. 47c

150 Working Volts

8—150 V	ea. 23c
8-8—150 V	ea. 23c
10—150 V	ea. 23c
10-10—150 V	ea. 29c
10-10-10—150 V	ea. 35c
15—150 V	ea. 25c
20—150 V	ea. 30c
30—150 V	ea. 35c
40—150 V	ea. 35c
15-15—150 V	ea. 35c
20-10—150 V	ea. 35c
20-20—150 V	ea. 35c
30-20—150 V	ea. 47c
30-30—150 V	ea. 47c
35-35—150 V	ea. 47c
40-20—150 V	ea. 47c
40-40—150 V	ea. 47c

40-40—150 V 20-25 V	ea. 47c
50-30—150 V	ea. 47c
20-16-16—350 V Sprague type	ea. 47c
25-25—150 V-200-10 V	ea. 47c
15-15-40-20—150 V-25 V	ea. 35c
20-20—150 V-25 V	ea. 47c
30-30-200—150 V-10 V	ea. 47c
20-16-16—150 V	ea. 47c

Cathode Condensers
10-25 V, 20-20—25 V, 20-20-20—25 V **19c ea.**
30-50 V
100—25 V ... 29c ea.

BY-PASS CONDENSERS

100 Condensers assorted in package ... **$7.14**

.001	6c	.0005	7c
.002	6c	.00025	
.005	6c	.0005	
.01	8c	500 mmf	
.02	8c	250 mmf	
.05	10c	100 mmf	
.1	11c	50 mmf	

600 V. — 600 V. MICA

BYPASS SPECIAL—SOLAR
In lots of 25 or more ... ea. 11c
.25 mfd. 600 V. ... Less than 25 ea. 14c

400-VOLT BY-PASS CONDENSERS
.05 mfd. ... ea. 7c
.2 mfd. ... ea. 7c
.25 mfd. ... ea. 12c
.5 mfd. ... ea. 18c

BUFFER CONDENSERS
.005 mfd. 1600 WV, .008 mfd. 1600 WV, .01 mfd. 1600 WV ... ea. **18c**

VARIABLE CONDENSERS
Two-gang for superhet or TRF ... ea. **53c**

IF TRANSFORMERS

Standard Replacement Regular size 455 Kc. ... ea. **35c**
Midget 455 Kc. ... ea. 47c
Midget 10.7 AM-FM ... 59c

OSCILLATOR COILS

for any 5-tube AC-DC ... **23c**

HOOK-UP WIRE

100 ft. ... 69c

6-FT. LINE CORDS

Good Rubber with plug
10 for ... **$2.13**
Underwriters' Approved.
10 for ... **$2.79**

SPECIALS

10% deposit with order, balance COD. $1.00 handling charge for orders less than $5.00. All shipments FOB Chicago. Our parts and tubes are warranted to be 100% replacements for the prototypes in the listings above. Prices are subject to revision without notice. Satisfaction Guaranteed. Illinois residents add 2% sales tax. ORDER TODAY!

Order Today

Premier RADIO TUBE CO.

551 West Randolph St.
Chicago 6, Illinois
Phone: ANdover 3-1590

PLATT'S AT BAT...

YOU'LL FIND BARGAINS GALORE at
PLATT'S BIG STORE

Say, friend, if you live in New York City or if you come up to the big town on business or vacation, why not drop in at PLATT'S VALUE-PACKED RETAIL STORE? Platt has so many bargains (unfortunately, space does not permit him to list them all here) that it's really a shame to pass them up. The savings are yours—so pay PLATT a visit and bring your friends, too.

TUBES
Brand New Standard Brands

5BP4	$ 2.75
3CP1	.59
10Y	.39
801	.69
4AP10	2.50
100TH	17.50
807	1.79
211	.49

SCR-27N COMMAND and ARC-5 EQUIPMENT

RECEIVERS

	USED	NEW
BC-453—190 to 550 KC	$12.95	
BC-454—3 to 6 MC.	7.95	
BC-455—6 to 9 MC	6.95	$11.95
R-23—ARC 5—190-550 KC		21.95

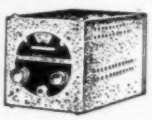
TRANSMITTERS

BC-457—4 to 5.3 MC	5.95	
BC-458—5.3 to 7 MC	5.95	10.95
BC-696—3 to 4 MC	14.95	24.95
T-19—ARC 5—3 to 4 MC		24.95
BC-459—7 to 9.1 MC	12.95	24.95
T-22—ARC 5—7 to 9.1 MC	12.95	24.95

ADDITIONAL EQUIPMENT

BC-456 Modulator	2.25	3.25
BC-450 Control Box (3 Receiver)	.98	1.95
BC-451 Control Box (Transmitter)	.89	1.49
BC-442 Relay Unit (ANT)	1.95	2.95
Plugs: PL-147, 148, 151, 152, 153, 154, 156—EACH	.75	
Flexible Shafting with gear to fit Receivers		1.69
3 Receiver Rack	2.25	
2 Transmitter Rack	1.69	

BEACON RECEIVER BC-438
Manufactured by Detrola



Frequency Range—200 KC to 400 KC. IF Frequency—142.5 KC Receiver Sensitivity — 5 Microvolts for 10 Milliwatts output. Output Impedance—300 Ohms and 4000 Ohms to be selected internally. Power Output—150 Milliwatts. Volume Control—RF Gain Control. Power Supply — 24-28 Volts Aeroplane Battery. Current—1.0 Amperes. 6 tubes.

$10.95

BRAND NEW—ONLY

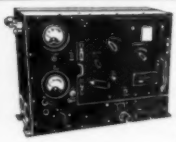
DYNAMOTORS

	USED	NEW
DM-32A—Input 28V, output 250 VDC, .06 amps	$2.95	$ 4.95
DM-34—input 12V or 14V at 2.8 amps, output 220 V at 80 MA	8.95	
DM-25A—12 V. input 2.3 amps. 250V output at 50 MA. Ideal for use on command receivers for mobile use		4.95
DA-1A—input 28 VDC at 1.6 amps, output 230 VDC at 1 amp		6.95
DY-12—for ART-13 Power Supply. 12V, 9.4 amps, 1 output 275V @ 110 MA, 2-500V @ 50 MA		6.95
DM-53A—24V input, 220 VDC, output at 80 MA		2.95
PE-125 Vibrator Power Supply. 12 or 24 VDC designed for BC-223 Transmitter, output 400V at 200 MA, 8V at 4.5 amps		18.95
PE-103A Dynamotor with power unit. Ideal for mobile use. input 6V at 21A, output 500V 1.6A or 12V at 11A, output 500V 1.6A. Used with SCR-284		24.95
BD-86—Input 14V 2.2 amps., output 600V .3 amps. With fuse and Cond. Box on Mount		7.95
DM-36 Dynamotor, input 24V to 28V 1.4A, output 220V at .08 amps. Complete with mounting base and Jones Plug	2.95	
PE-94—input 28V, output 14.5V at 4.9 amps, 150V at 10 MA, 300 V at 260 MA. Used with SCR-522	5.95	9.95
MP-28RA—A dynotor power supply unit, input 25 to 28V 14, 8 amps DC, output 540V 450 MA DC. With a transmitter modulation section using 1—6N7, 1—6F6 and a pair of 807 tubes in push-pull. Also includes modulation transformer. Used for Bendix TA-12		45.00

Multitester Foundation BIAS METER 1-97A

Contains a zero center 3½" round Marion voltmeter calibrated 0-100 volts each side. Movement is fine mill each side of center. The unit is mounted in a steel box 7"x5"x 4½" and contains 8 contact push buttons, line cord dual 100 MFD at 200 V DC condenser, a potentiometer 6 1RC 1% wire wound non-inductive resistors: one 400 ohm, two 2500 ohm, one 5000 ohm, one 10,000 ohm, one 15,000 ohm.
Excellent for building a zero center multitester with ranges of 1, 10, 100, 1000 volt.
COMPLETE BRAND NEW **$5.95**

BC-223 TRANSMITTER



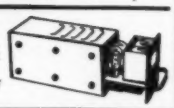
A 30 watt Transmitter, ideal for ship-to-shore or Ham Rig. Crystal or MO control on four pre-selected channels. 2000 to 5250 KC. Use of 3 plug-in coils, five tubes: 2—801 and 3—46, and TU 17-18-25 tuning units.

TRANSMITTER	$25.95
TUBES	3.75
TUNING UNITS	2.25 ea.
PE-125 VIBRATOR POWER SUPPLY FOR BC-223	$18.95

20 POUNDS OF ASSORTED RADIO PARTS

ONLY **$3.39**

TURBO AMPLIFIER



4 tube Amplifier used by U.S. Air Force. 115 V. input at 400 cyc.
Without tubes—BRAND NEW $1.49

FIELD TELEPHONES

Army surplus, completely reconditioned and electrically tested, using 2 flashlight cells and a pair of interconnecting wires. GUARANTEED—like new.
ONLY **$15.95**

Control Box BC-434-A

Used with Radio Compass receiver RA-ARN-7. Bendix ADF Equipment.
Only **$2.95**

Control Box BC-648-A

Excellent condition. Made by Westinghouse. Terrific value!
Only **$3.29**

BC-221 FREQUENCY METER

This is a Terrific Value! QUANTITY IS LIMITED—so first come, first served. They are just like new, with original calibration charts. Range 125-20,000 KC with crystal check points in all ranges. Complete with crystal and tubes.
ONLY **$99.50**

WOOD CASES for 221 FREQUENCY METERS
Brand New .....$3.95 Used $2.25

MINIMUM ORDER $2.00
Immediate Delivery—Send 25% deposit on C.O.D. orders. All shipments F.O.B., N.Y.C. (N.Y.C. residents add sales tax to your remittance.)

BC-1066 RADIO RECEIVER

Receives radio frequency signals for checking frequency and operation of other radio equipment. Coverage is obtained by 2 bands, I and G. Battery operated. New with tubes..... **$8.95**

MN-26Y INSTALLATION

MN-26Y Receiver—Remote control commercial type navigational. Indicates direction of any desired transmitting station. 3 bands—frequency range: 150 KC to 1500 KC; has 12—6 V type tubes. BRAND NEW (Original Cost $600.00) **$22.95**

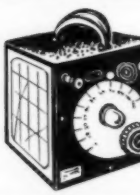
TYPE MN-20E ROTATABLE LOOP UNIT

8" diameter, used with MN-26 Compass and RA 10DB. Manufactured by Bendix. A TERRIFIC BUY!
ONLY..... **$11.95**

FL-8 RADIO FILTER

Can be converted for use with many types of transmitters and receivers. Complete write-up in May, 1950, Issue of CQ Magazine.
EXCELLENT CONDITION **$1.29**

BC-1255 MONITOR



A battery-operated receiver, 75-150 MC range. Used as monitor in operation and calibration of radio transmitters.
BRAND NEW **$14.95**

TS-268/U CRYSTAL RECTIFIER TEST SET

Brand New—complete with set of spare parts..... **$39.95**

AN80A ANTENNA

for BC-645... **30c**

HEAVY DUTY LINE CORD
8 ft. rubber covered, UL approved.....29c

SPECIAL BARGAINS!

BC-348 Receiver—Guaranteed, CAA Tested, Like New	$150.00
BC-224 Receiver—Guaranteed, CAA Tested, Like New	119.50

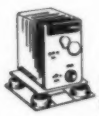
PLATT ELECTRONICS CORP.
DEPT. A, 489 BROOME ST., NEW YORK 13, N. Y.
PHONES: WO 4-0827 and WO 4-0828

WRITE FOR OUR BIG 1951 CATALOG AND SAVE PLENTY

AND THAT MEANS BIG SAVINGS FOR YOU!

ARMY TEST UNIT 1-236

Meter is contained in a metal box 5½" long x 3¾" wide x 3¼" deep. Comes complete with test leads and instruction book. Can be used for testing between AC & DC measuring resistances of circuits, checking fuses, and testing capacitors. ONLY **$7.95**

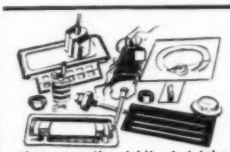


RADIO RECEIVER BC-1023-A and MOUNTING FT-161

UHF aircraft receiver with frequency range from 62 to 80 MCS for receiving 75 MC marker beacon signals ....BRAND NEW! **$7.95**

WIRE WOUND RESISTORS

50,000 ohms 100 watt....79c
14 ohms 25 watt....15c
8.3 ohms 25 watt....15c
1700 ohms 15 watt....15c
1000 ohms 10 watt....15c
11,500 ohms overall, tapped at 3000 ohms, 7500 ohms, 23 ohms, 750 ohms, 200 watt....$1.19



SPECIAL! A BUNDLE OF KITS

Unfortunately space does not allow us to list all the individual parts of these sensational kits, but take Platt's word—they're value-packed!

1 Kit of 25 assorted metal and plastic ESCUTCHEON PLATES $2.49
1 Kit of 25 assorted DIAL FACES, finished in various stages and used on present high priced broadcast receivers. (Can be used with above kit) 2.79
1 Kit of 100 assorted RADIO KNOBS—push-on, screw-on, pointer-type, long neck.... 3.89
1 Kit of 12 assorted SWITCHES—many uses: TV, electrical, circuit breakers, wafers, etc.... 3.49
1 Kit of 25 assorted COILS AND CHOKES—IF's, antenna, broadcast and short wave.... 1.79
1 Kit of 6 WAFER SWITCHES.... .69
1 Kit of 4 VOLUME CONTROLS—consisting of dual half meg long shaft, 1 meg short shaft, 100,000 ohm short shaft, 1 on and off switch .... .59

IF COILS

456 KC with adjustable Trimmer, special type ceramic base, round can....29c
465 KC, large cans....29c
455 KC....29c

PUSH BUTTON SLUG TUNER for AC-DC Sets....only **99c**

SWITCHES

3 amps @ 125 V—push button switch....15c
Toggle Switch, Bat Handle, SPST....19c

ANTENNA LOOPS for AC-DC Sets

Antenna Loop—RMA Approved, eliminates aerial and ground, equipped with .01-400 V Paper Tubular Condenser and 120 MMF Mica Condenser....59c

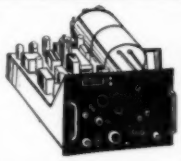
Built-in Antenna for local or powerful stations, no other antenna is needed. If reception of distant stations is desired, there is an external outlet for outside antenna. Equipped with 1000 ohm resistor....49c

Antenna Loop with mount—has one clip for ground, one clip for external antenna....39c
Antenna Loop less mount....15c

MICROPHONES

T-17-B, Hand-held carbon microphone for use in voice communication. Effectively covers the audio frequency range from 300 to 2600 CPS. 200 ohms, with press-to-talk switch, 5 ft. rubber cord and plug. NEW....$5.95
T-30 Microphone suitable for aircraft use. Responds to frequencies in the range of 400 CPS to 2000 CPS. Complete with cord and plug. Original Packing. NEW.... 1.29
T-44C Magnetic type mike with cord, plug and jack. Brand New.... .89

T-85/APT-5 UHF TRANSMITTER



Frequency range 300-1500 MC. 20 watts output, band width 2.5-3 MC. Complete with 8 tubes and 110 V 60 cyc. fil. transformer. Calibrated in centimeters. New in original box with operating Instruction Manual.. **$79.50**

APN/1 RADIO ALTIMETERS

A complete NEW 14 tube Radio Altimeter. Contains 420 MC Transmitter and Receiver, Power Supply, Range Switches, Two Antennas, Meter Indicator, All Plugs and Instruction Manual. This unit makes an excellent amateur station as it is right in the band.....BRAND NEW—ONLY **$24.95**

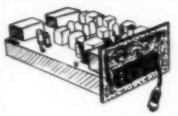
PRE-AMPLIFIER MODEL K-1

The K-1 is used to amplify output level for microphones and phonographs. Operates on 24-28 VDC, can be converted to 110 AC. Comes complete with PL 55 plug and 2 foot 119-B cord, 2 terminal blocks and instruction book.
BRAND NEW .....SPECIAL **$3.95**

HEADSETS

HS-33 low impedance with cord and plug, used, fine condition....$1.39
HS-23 high impedance, BRAND NEW with ear pads.... 3.25
HS-33 low impedance, BRAND NEW with ear pads, cord and PL54 plug 3.50
TH-37A—1200 ohms with dual plugs.... 2.95
HS-30 with ear plugs, low impedance, used, good condition .... .89

BC-620 RECEIVER-TRANSMITTER



2 crystal channels — 20 to 27.8 MC, FM-13 tubes. Metered, Plate and Filament.
NEW **$24.95**

PE-97 POWER SUPPLY for BC-620

6 or 12 V vibrator type. NEW—less tubes, vibrator.

$3.95

CORDS AND PLUGS

CD 508A Cord Assembly with SW 14-U Switch and 2 cord attachments with JK 48 Jack and PL 68 Plug. Value—$5.00. Our Special Low Price, Brand New....59c
CD307A with PL 55 and JK. New $1.29
JK 26 Jack only—Brand New....20c
PL 55 Plug—NEW....35c
PL 68 Plug—NEW....25c
Jones plug 8 contact male and female....25c
PL-Q-59 ....49c
PL-P-60 ....49c
PL-Q-61 ....49c
PL-Q-62 ....49c
PL-Q-77 ....69c
PL-Q-171 ....89c
PL-153-A 69c
PL-172 ....89c

CONDENSER SALE!

OIL FILLED CONDENSERS

.1 MFD—3000 VDC, round can $0.79
1 MFD—1000 VDC, rect. can .... .69
1 MFD—600 VDC, rect. can .... .49
2 MFD—600 VDC, rect. can .... .69
2 MFD—600 VDC, round can .... .69
.25 MFD—3500 VDC, rect. can.... 1.29
.25 MFD—6000 VDC, rect. Can, G.E.... 1.29
2 MFD—4000 VDC, G.E., large.... 3.97
30 MFD—90 V, 3 phase, G.E., large, 60 cycles. 1.39
1.25 MFD—220 VAC, Western Electric Motor cond .... .29
TLA 6040—4 MFD 600 V.... 1.29

FILTER CONDENSERS

15x15 MFD—450x350 V....59c
8x8x20 MFD—300x300x150 V....89c
10x50 MFD—450x25 V....39c
1000 MFD—15 V—EP Type....33c
3000 MFD—3 V—FP Type....48c
4x10 MFD—400 V—FP Type....69c
100 MFD—50 V—FP Type....49c
1000 MFD—10 V—FP Type....39c
3x20 MFD—25 V—FP Type....39c

BATHTUB CONDENSERS

.5—.5 MFD—100 VDC (Top Terminals) 9c
20 MFD—350 VDC (Side Terminals).29c
2 MFD—400 WV-600 Peak V (Side Terminals) 29c
.5 MFD—100 VDC—2.6 MFD—400 VDC (Side Terminals) 39c
2x1 MFD—600 VDC (Bottom Terminals)....39c

TRANSMITTING MICA CONDENSERS

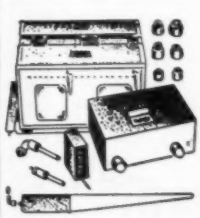
.00075 MFD—5000 V....79c
.0015 MFD—5000 V....89c
.03 MFD—1500 V....79c

ELECTROLYTIC CONDENSERS

3x20 MFD @ 100 WVDC....39c
16 MFD @ 350 WVDC....59c
4-6-6-5 MFD @ 250-200-150-25 WVDC....69c
8-8-20 MFD @ 300-300-150 WVDC....59c
8-12-12-5 MFD @ 250-200-150-25 WVDC....69c
10-50 MFD @ 450-25 WVDC....39c
15-15 MFD @ 450-350 WVDC....59c

TRIMMER CONDENSERS

Dual Capacitor—30 to 110 MMF....15c
Single Capacitor—20 to 80 MMF....12c



RECONDITIONED SCR-522

With New Components

Very High Frequency TRANSMITTER-RECEIVER

100-156MC, 4 Channels, Crystal-Controlled, Amplitude Modulated Voice. Electrically Tested.

Complete as shown
Only $84.50

BRAND NEW—$92.50

SCR-522C—Complete as above—Brand New..$129.50

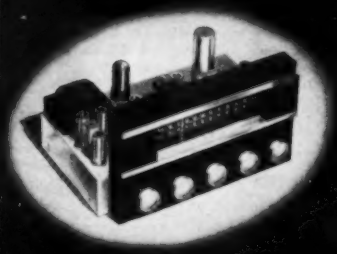
SEND FOR OUR FREE CATALOG

MINIMUM ORDER $2.00

Immediate Delivery—Send 25% deposit on C.O.D. orders. All shipments F.O.B., N.Y.C. (N.Y.C. residents add sales tax to your remittance.)

PLATT ELECTRONICS CORP.
DEPT. A, 489 BROOME ST., NEW YORK 13, N. Y.
PHONES: WO 4-0827 and WO 4-0828

this is it—
this is the tuner
you designed!



the
CRAFTSMEN RC-10
HIGH FIDELITY
FM-AM TUNER

This new tuner was your idea. It is the precisely engineered answer to hundreds of questions . . . the solution to scores of problems . . . the outgrowth of countless suggestions we've received from you. Developed from your ideas—and a few of ours—the RC-10 retains every feature of the famous RC-8. And it offers a host of innovations.

- Built-in pre-amplifier compensated for reluctance pickups.
- Automatic Frequency Control entirely eliminates drift, simplifies tuning.
- 5 microvolt sensitivity on both FM and AM.
- 10 kc filter on AM eliminates inter-station squeals.
- Base and treble tone controls for boost, cut, or 20—20,000 cycle flat response.

SEE . . . the RC-100A ultra-sensitive, custom TV with built-in booster.

HEAR . . . the RC-2 high fidelity amplifier. All units finished in chrome.

Write for information—or send 50¢ for instructions and schematics.

THE RADIO craftsmen INCORPORATED

Dept. R 11, 1617 S. Michigan Ave., Chicago 16, Ill.

What's New in Radio

For additional information on any of the items described herein, readers are asked to write direct to the manufacturer. By mentioning RADIO & TELEVISION NEWS, the page, and the issue number, delay will be avoided.

VOLTAGE REGULATOR

The *Thordarson-Meissner Mfg. Division* of *Maguire Industries*, 500 West Huron Street, Chicago 10, Illinois has developed a new, low-cost automatic voltage regulator which is designed to protect electric motors and other electrical appliances from damage resulting from excessive line voltage fluctuations.

The new "Power Guard" is rated at 750 va., uses a power transformer with tapped windings, and is electrically

adjusted to keep the output voltage within certain prescribed limits. The relay used in the unit is chatterproof and the unit itself is filtered to prevent interference to radio or TV reception.

Available in a conduit box type housing, the regulator meets certain electrical codes for permanent installations. The semi-portable unit is housed in a well-ventilated gray wrinkle-finish steel case.

NEW NATIONAL RADIO

The National Company of Malden, Massachusetts is currently in production on a new, compact, and low-priced radio receiver, the SW-54.

A general coverage receiver, the set measures 11" long, 7" wide, and 7" deep and covers the entire range from 540 kc. to 30 mc., voice, music, or code. Designed especially for the short-wave listener and for standby amateur use,

the dial has police, foreign, amateur, and ship bands clearly marked. The set features a unique plastic band-spread dial, new miniature tubes, and simplified operation.

Complete details on the SW-54 are available from the company.

TEST LIGHT

A new test light which features a wide voltage range and is constructed to withstand the most rugged usage is now being offered by *Industrial Devices, Inc.* of Edgewater, New Jersey.

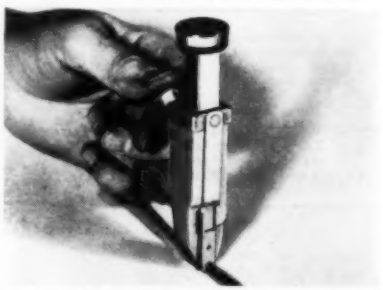
Designated as the "Lo-Volt" test light Model #1300, the new unit is encased in a plastic housing that will stand abuse that would break the average glass test light. Flexible leads with durable coverings 10" long are terminated in spring clips.

The plastic bulb lights up on any voltage from 3 to 25 volts a.c. or d.c. A second model, the #1310, covers a range of from 6 to 50 volts a.c. or d.c.

AUTOMATIC TACKER

The Heller Company of 2153-N Superior Avenue, Cleveland 14, Ohio has come out with a new pocket-size staple tacker which is especially designed to save time and money in making wire installations.

The new tacker staples braided, rub-



ber-coated, single and double strand wire, and hollow tube lines. Front and rear guides circle the wire and permit rapid drawing around difficult angles or corners, along baseboards, plaster walls, window frames, ceilings, door jambs, and rafters.

The tacker uses a special staple which is available in several colors. The driving point of these staples is designed to penetrate plaster, composition board, and hard and soft woods with a holding power up to 64 pounds. The staples may be driven to any desired depth without marring or injuring the wire.

VEHICULAR CONDENSERS

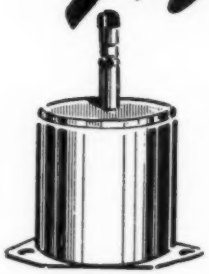
Cornell-Dubilier Electric Corp. of South Plainfield, New Jersey is now offering a new line of bypass and feed-through vehicular condensers which are designed to suppress radio frequency interference.

TRANSMITTING *Mica* CONDENSERS

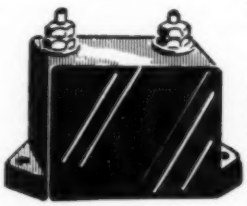
SPECIAL LOW PRICES FOR IMMEDIATE SALE AND DELIVERY

We have literally hundreds of thousands of these top quality standard type transmitting mica condensers in stock for immediate delivery at a fraction of their original cost. Every condenser is brand new and carries the name of a fine nationally known manufacturer.

Despite the unusually low prices, these mica condensers, like all Wells Components, are fully guaranteed. Be sure to order sufficient quantities for your requirements.



STYLE "A"



STYLE "B"

STYLE "C"

STYLE "D"

STYLE "E"

NOTE:

Order by capacity and type number—specify choice of manufacture.

CAPACITY	WORKING VOLTAGE	MFG. LEGEND	UNIT PRICE
TYPE A			
.000025	10MV	8	$1.95
.000025	7MV A.C.	2	1.95
TYPE B			
.00007	1140	6	$ .85
.00015	5000	8	1.45
.0002	1430	6	1.05
.0002	5000	1-8	1.50
.00025	2500	7	1.35
.00025	5000	1-7	1.55
.0004	5000	2-7-8	1.65
.0004	6000	1	1.75
.00052	2000	7	1.35
.00055	5000	3	1.90
.0006	2500	7	1.35
.00072	5000	2	1.85
.00075	2500	2	1.40
.0008	5000	2	1.85
.001	5000	7	1.95
.0011	5000	7	1.95
.002	3000	2	1.75
.002	6000	6	2.20
.0024	1500	3	1.45
.003	2000	7	1.55
.004	3000	8	1.75
.005	2000	2	1.70
.005	3000	8	1.95
.006	3500	8	2.00
.0068	3000	8	1.85
.008	3000	7-8	1.95
.01	2000	3	1.85
.015	2000	1	1.75
.02	500	7	1.50
.02	2000	8	1.95
.024	1500	3	1.85
.033	1500	3-7	2.10
.056	1000	3-7	2.10
.06	1000	8	2.20
.1	1000	8	2.25
TYPE B (Small Size)			
.00003	2000	2-7-9	$1.10
.00005	3000	2-7	1.20
.00008	3000	9	1.25
.00009	3000	2-7-9	1.25
.0001	3000	2-7-9	1.30
.000107	3500	1	1.75
.000110	3000	8	2.10
.000175	1500	8	1.30
.0002	3000	7-8	2.05
.0004	3000	2-7-9	$1.45
.0005	3000	3	1.55
.00055	3000	7	1.75
.000625	3000	2-7	1.95
.0008	3000	7	1.70
.00125	2000	1-2-7	1.65
.0024	3000	8	1.95
.0025	2000	1-2-7	1.85
.00275	2000	1-7	1.90
.005	2000	2	1.75
.006	2000	8	1.85
.006	2500	7	2.10
.01	1000	7	1.65
.01	2000	1	1.85
TYPE C			
.000005	2500	2	$ .50
.0001	600	2-7	.35
.0001	1200	6	.45
.0001	2500	6-7-8	.60
.0002	600	2	.35
.0002	2500	7	.50
.0003	2500	7	.60
.00039	2500	7	.75
.0004	2500	2-7	.55
.0005	600	7-8	.45
.0005	1200	2-7	.55
.0005	2500	2	.75
.001	600	8	.45
.001	1200	2-7	.50
.001	2500	2	.75
.0035	2500	7	.85
.004	2500	2-7	.75
.0046	500	9	.55
.0047	2500	8	.80
.005	600	2	.45
.005	1200	7	.55
.0051	2500	8	.85
.0056	2500	8	.85
.006	600	7	.50
.006	1200	2	.75
.008	600	8	.65
.01	600	1-8-9	.50
.01	1200	1-2-7-8	$ .65
.01	1250	9	.70
.01	2500	7	.80
.0115	600	8	.65
.013	1200	3	.65
.015	1200	7	.65
.015	2000	8	.75
.0175	1200	2	.80
.02	600	7	.45
.04	600	7-8	.45
TYPE D			
.00005	1200	1-7	$ .35
.00005	2500	2-7-8-9	.40
.0001	1200	7	.40
.0001	1250	1	.45
.00015	2500	6	.50
.0002	2500	2-9	.45
.00024	2500	6	.50
.00025	1200	8	.35
.00025	2500	8	.45
.0005	1200	7	.40
.00051	2500	1	.50
.0007	600	2	.35
.001	600	1-2-7	.35
.001	1000	9	.40
.001	1200	5-8	.45
.001	2500	2-6-8	.55
.0011	2500	8	.55
.002	600	1-7-9	.35
.002	1200	1-2-7-8	.45
.0022	1200	7-8	.45
.0022	2500	7	.55
.0025	1200	1-2	.40
.0027	600	1	.35
.003	1200	1-6-7	.40
.0033	1200	6	.45
.004	1200	8	.45
.0044	600	8	.35
.0047	2500	6	.50
.005	600	6	.35
.005	2500	2	.45
.006	750	1	.40
.01	300	1-4	.30
.01	600	2-8	.35
.01	1100	6	.45
.01	1200	6-8	.50
.01	1250	1	.55
.02	600	1-2-4	.35
.022	600	7	.40
.025	600	7	.35
.027	600	1-7	.40
.03	600	1-2-7	.45
TYPE D Lug Mtg.			
.004	2500	3	$ .30
.01	1200	3	.25
.03	600	3	.20
TYPE E			
.00025	500	5-7	.25
.0008	750	2	.30
.001	500	5	$ .25
.001	750	7	.30
.002	750	7	.30
.003	750	7	.30
.004	500	7	.30
.005	1000	5	.40
.006	750	5-7	.30
.01	500	5	.30
.01	1200	7	.40

Wide Selection of Electronic Components at

WELLS

Tubes • Resistors
Condensers
Wire and Cable
Volume Controls
Co-ax Connectors
Relays • Rectifiers
Transformers • Chokes
Micro Switches, Toggles
Antennas, Accessories
Electronic Assemblies
Dial Light Assemblies

LEGEND:

1—Aerovox	6—Micamold
2—C-D	7—Sangamo
3—Faradon	8—Solar
4—Elmenco	9—Sprague
5—Illini	

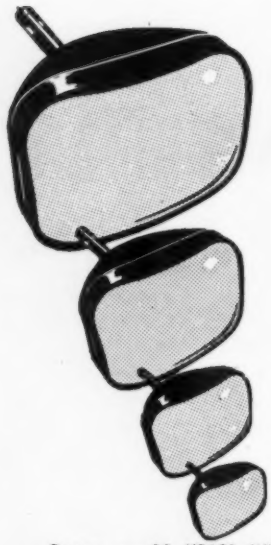
This is only a partial listing. Write or wire for information on types not shown and for receiving set micas and silver micas.

WELLS SALES, INC.

We advise distributors to order immediately from this ad. Our standard jobber arrangement applies.

Manufacturers and Distributors: Write for our complete Mica Condenser Listing

833 W. CHICAGO AVE., Dept. R, CHICAGO 22, Ill.



ELECTRONIC BUSINESS MACHINES

That's what we call the 16", 17" and 20" rectangular neutral-density-filter tubes that Reeves Soundcraft Corp. is manufacturing as successors to Remington Rand's TV Picture Tube Division.

IT IS GOOD BUSINESS to INCORPORATE Reeves Soundcraft "TRULUMES" as the BUSINESS end of TV sets you manufacture, service, convert, or for which you stock tubes.

In the coming months more and more of these fine rectangulars will become available. An inquiry NOW will enable us to tell you how YOU may sooner become one of our happy kinescopic beneficiaries.

Dictate an inquiry today.

Reeves — 20 YEARS WITH ELECTRONICS IN PEACE AND WAR: *Optical and magnetic film sound recording facilities, equipment, and supplies; "acetate" discs and magnetic tape; transformers; projection TV; crystals; electronic computors.*

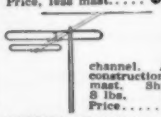
REEVES Soundcraft CORP.
COLORCRAFT PICTURE TUBE DIV.
35-54 36th STREET, LONG ISLAND CITY 6, N. Y.
SUCCESSORS TO REMINGTON-RAND TELEVISION PICTURE TUBE DIV.

OUTSTANDING - TV - VALUES

MODEL #300
Folded dipole complete with reflector and high frequency adapter. Covers 13 channels. All alum. construction. Less mast. Shpg. wt. 7 lbs. **PRICE** **$5.25**

MODEL #200-D
Stacked array. Consists of 2 complete conicals and connecting bars. Very rigid construction. Covers all 13 channels. Matches 300 Ohm or 72 Ohm. Center impedance 150 Ohm. Ideal for low signal areas. An outstanding buy. Shpg. wt. 12 lbs. **SENSATIONAL OFFER** at, less mast. **$9.50**

MODEL #200-S
Single array. Same construction as above. Shpg. wt. 7 lbs. **Price, less mast.** **$4.50**



MODEL #500
All-band folded dipole antenna. Ideal for rotator use. Maximum gain on any channel. Alum. construction. Less mast. Shpg. wt. 8 lbs. **Price** **$5.25**

MODEL #Y-100
3 element Yagi Hi-Gain beam designed specifically for fringe area use. All alum. construction. Cut to specific channels. Shpg. wt. 4 lbs. Channel #7, **$5.80**; Channel #9, **$5.20**; Channel #11, **$4.60**; and Channel #13, **$4.00**. The prices are less mast. "Y" type antenna. **Price $4.25**

FULLY AUTOMATIC BOOSTER—automatic on-off, automatic tuning, concealed installation, single or dual input, full band width on all channels, high uniform gain, 19 db on low 2-6, FM and 14 db on high 7-13. **Specially priced** **$29.95**

ANTENNA ACCESSORIES

CM-100 Chimney Mount	$ 1.50
WM-104 Wall Mount 4"	.98
WM-107 Wall Mount 7"	1.25
U-100 "Universal" Ant. Mtg. Bkt. Offset to 8". Price	3.95
U-200 Same as U-100 but Offset to 12". Price	6.95
3½" 300-ohm stand-off insulators fit coax cable). Per 100, $3.00; per 500, $12.00; per 1000,	20.00
Best Quality 300-ohm twin lead—Send for prices.	
High Quality 72-ohm Coax Cable—Send for prices.	
Folded Dipole Hi-Frequency Adapters	1.50
Straight Dipole Hi-Frequency Adapters	1.50

TERMS: All shipments F.O.B. Newark, New Jersey. 25% deposit with orders, balance C.O.D. Minimum order $2.00. Include ample postage.

Prices Subject to Change Without Notice

EAST COAST ELECTRONICS
39 George St. Dept. 3-N Newark 5, New Jersey

those costly service calls with . . .

ELECTRO ANTENNA KOTE

For better reception use Antenna Kote; a newly developed chemical compound. Recommended for safely coating all exposed exterior television and high frequency connections.
Dielectric Strength — Volts/Mil 1050.
(May be used for arrest of voltage leakage)
Dries hard in 8 hours.
(A non-electrical conductor)
Eliminates rust and corrosion.
(Does away with the use of tape)
Excellent resistance to heat, oil, acid, salt water, chemicals and moisture.

A Complete Line of Electronic Chemicals
Exclusive territories for sales representatives. write for particulars . . .

DAKOLINE CHEMICAL CO., INC.
ELECTRONIC CHEMICALS DIVISION
357 Atlantic Ave., Brooklyn 2, N. Y.

These units are hermetically sealed and built to withstand extremes of vibration, shock, and operation over a temperature range of from —55 degrees C to +85 degrees C. Non-inductively wound with short internal connections results in low impedance over a wide frequency range.

The MC series is provided in three bracket styles. The NF 10072 is equipped with a universal mounting bracket. All have terminal studs with fastener screws. The MC series is for bypass applications while the NF series is designed for feedthrough. A bulletin, NB-140, covering these units is available from the company.

REMOTE MIXER-PREAMP

Rauland-Borg Corporation of 3515 Addison Street, Chicago 18, Illinois has recently introduced a new self-contained remote mixer and preamplifier, the Model 1904.

This unit is designed to mix four inputs (high or low impedance mikes and crystal pickups) and to feed the program over a remote line to the

main amplifying equipment located at any required distance away, even though the distance is up to several miles.

The Model 1904 may be converted for use with from one to four low impedance mikes by inserting the company's R1002 plug-in transformers. The unit also features a master gain control, separate bass and treble controls, and a self-contained 24 volt a.c. supply and switch for remote relay control of the main amplifying equipment.

Details on the Model 1904, which is housed in a light green hammerloid cabinet measuring 13½" x 8" x 7", are available from the company.

"COBRA"-TYPE HORN

Racon Electric Co., Inc. of 52 East 19th Street, New York 3, New York has announced the development of a new "cobra"-type horn, the COB-11.

Designed for public address systems requiring a high degree of clarity with maximum concentration of sound in the horizontal plane, the horn provides a uniform sound field over a horizontal angle of 120 degrees and a vertical angle of 40 degrees. The unit is of "straight" horn design and is exponentially flared throughout for maximum transfer of energy. The low frequency cut-off design point is 250 cycles.

The horn is built of a heavy two-piece, non-vibratory aluminum casting designed to withstand hard usage

both indoors and out. It is provided with a rib-reinforced, two-section serrated mounting bracket which permits coupling to a standard 1¼" mounting

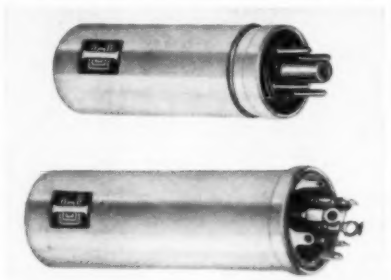
flange. Finish is in weather-resistant gray hammertone over a zinc chromate primer.

Complete details on the COB-11 will be furnished by the company on request.

ELECTROLYTIC CONDENSERS

Illinois Condenser Company, 1616 North Throop Street, Chicago 22, Illinois is now marketing a new line of plug-in and twist-prong electrolytic condensers which have been designed to meet the most exacting commercial and JAN specifications.

The new units feature a completely new phenolic molded cap structure that hermetically seals the containers. The hermetic seal, employing molded-in terminals, permits the unit to be



used in all types of installations from adverse marine operations to stratosphere use.

The line is available in both high and low voltage ratings and is suitable for TV and other usual electronic applications in addition to aircraft, fire, police, and other related emergency services for new installations as well as replacements.

NEW INTERCOM

A new type of intercommunication system has been developed by *Talk-O Products, Inc.* of Allen Street, Rochester 6, New York.

Featuring simplified installation and operation, the new units use only one amplifier. Electric current is drawn only during actual conversations as the amplifier is normally in the "off" position. When a call is put through the amplifier is turned on by a pat-

DUAL RESPONSE

Instantly Gives You High Fidelity or Rising Characteristic . . . as you want it!

IT'S IN THE *Cardax*

***First* High Level Cardioid Crystal Mike with *All* these Features!**

★ **EXCLUSIVE E-V DUAL FREQUENCY RESPONSE**
Convenient screw control provides:
1. *Smooth, Wide Range Response for High Fidelity Sound Pick-up.*
2. *Wide Range with Rising Characteristic for extra crispness of speech or emphasis of high frequencies.*

★ **HIGH OUTPUT LEVEL**

★ **E V MECHANOPHASE* CARDIOID**
Overcomes background noise, reverberation, feedback. Extends front pick-up range. Solves troublesome problems.

★ **ENCLOSED METAL-SEAL CRYSTAL**
Greater Protection against Moisture

★ **BUILT-IN "ON-OFF" SWITCH**

★ **HIGHEST PURITY PRESSURE CAST CASE**

★ **DURABLE SATIN CHROMIUM FINISH**

★ **TILTABLE HEAD. ⅝"-27 THREAD**

★ **BUILT-IN CABLE CONNECTOR**

Favorite of thousands for its quality, its performance, its value!

CARDAX Model 950. List Price. . **$42.50**

Ask your E-V Distributor
or SEND FOR FREE
CATALOG No. 110

NO FINER CHOICE THAN

Electro-Voice

ELECTRO-VOICE, INC.
410 CARROLL STREET, BUCHANAN, MICH.
EXPORT: 13 East 40th St., New York 16, U.S.A.
Cables: Arlab

E-V Pat. Pend. Licensed under Brush Patents.

USE the HANDBOOKS the EXPERTS use

Let
TELEVISION'S GUIDE

The VIDEO HANDBOOK

SOLVE YOUR PROBLEMS

The VIDEO HANDBOOK will assist you in every operation in television. Gives you clear understanding of the principles of television, knowledge of receivers, antennas, test equipment and transmitters.

Shows you expert methods of building, installing, testing and troubleshooting, servicing and aligning, in plain language and simple terms with easy-to-understand pictures and working diagrams.

Explains clearly the television station—transmission, operation and show production.

You get 900 pages of basic knowledge, methods, and data of television, completely illustrated with over 800 pattern pictures, drawings and diagrams.

Written by the Boyce-Roche experts who make electronic manuals for the U. S. Signal Corps. Over 20,000 in use.

SEND FOR YOURS TODAY. **$5.95**

The RADIO & ELECTRONICS HANDBOOK provides instruction and reference on fundamentals, parts, tubes, circuit elements, receivers, transmitters, amplifiers, systems, power supplies, antennas, meters, test equipment, and accessories, with complete Data Section, **$5.95**

SPECIAL OFFER

Save one dollar—Send for The RADIO & TELEVISION SET and get The RADIO & ELECTRONICS HANDBOOK and The VIDEO HANDBOOK in handsome slip case..... **$10.90**

(Regular price $11.90)

10-DAY FREE EXAMINATION COUPON

BOYCE-ROCHE BOOK CO.
CALDWELL 24, NEW JERSEY

Send ☐ Video Handbook @ $5.95
☐ Radio & Electronics Handbook @ $5.95
☐ Library Set @ $10.90 (Save One Dollar)

In ten days I will send you price plus postage or I will return book(s) postpaid. (Offer good only in U. S.)

Name.....

Address.....

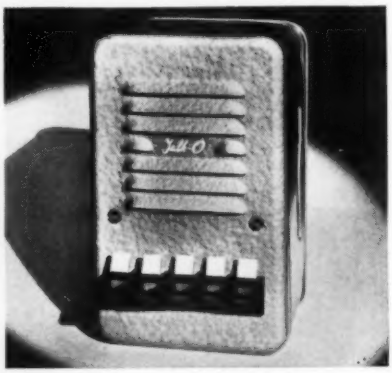
City, Zone, State.....

Employed By.....

Save Postage! We pay postage if you enclose full price now. Money back on same return privilege.

ented "on-off" switch. According to the company, the amplifier is entirely free from power line hum and electrical interference noises.

The units are housed in small cabinets whose light grey finish will har-



monize with most surroundings. The master stations are available in either desk or surface models while the remote stations may be had in call box, door, or trumpet styles. Shielded wire is not required and grounding and connecting precautions are not necessary.

A booklet describing the new units is available from the company on request.

SUBMINIATURE RELAY

The *Hufco Industries*, 2815 West Olive, Burbank, California has announced the development of a new subminiature, dynamically balanced relay for weight-critical electronic applications.

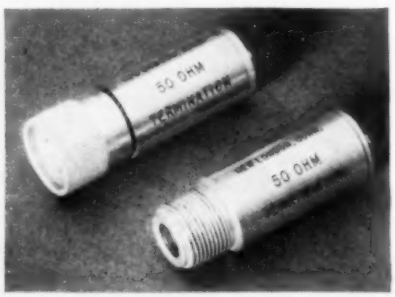
Tradenamed the "Wizard of Oz," this relay weighs less than ⅛ ounce and is designed to meet the specialized requirements for aircraft and missile installations.

The unique design of the dynamically balanced armature gives the Model 1001 high resistance to vibration and shock and sudden changes in acceleration and direction. It is a s.p.d.t., 28 volt d.c. unit with contacts rated at 1 ampere non-inductive load.

COAX LINE TERMINATIONS

New London Instrument Company, P.O. Box 189, New London, Connecticut has announced a new termination for coaxial transmission lines.

The unit which features low stand-



ing wave ratios from d.c. to over 3000 mc. is designed to be used in testing cables, slotted lines, r.f. bridges, sweep generators, and random noise sources. Impedance is 50 ohms.

The female fitting has been designated Model F-50 while the male fitting is known as the Model M-50.

PROBING TWEEZERS

Hytron Radio & Electronics Corp. of Salem, Massachusetts, has just released the eighth in its series of servicing tools for the technician.

The latest addition is a probing tweezer made of tough polystyrene of good electrical and mechanical characteristics.

The jaws of the tweezers grip firmly and are equipped with both fine and coarse serrations for different sizes of wires, resistors, etc.

The high dielectric properties of the polystyrene minimize detuning while servicing. The tweezers resist strong magnetic fields. The new tool is long enough for safe use in TV circuits and compact enough for application in crowded chassis.

DYNAMIC MIKE

The newest addition to the company's line of microphones is the 50D "Aristocrat" dynamic unit, according to word received from the *Turner Company* of Cedar Rapids, Iowa.

The new mike is finished in satin chrome and is suitable for TV, broad-

cast, recording, and public address work. The unit is individually calibrated in the laboratory to a response of 50 to 15,000 c.p.s., flat within ± 2.5 db.

A swivel-type mounting permits the microphone to be tilted in any direction for stand or boom use. A *Cannon* "Quick-Disconnect" plug makes it quickly detachable for hand use. The mike is omnidirectional and available in 15, 200, 500 ohm or high impedance. The sensitivity is 56 db. below 1 volt/-dyne/ sq. cm.

MINIATURE TUBULARS

Pyramid Electric Company of 1445 Hudson Boulevard, North Bergen, N. J. has just released a new line of miniature tubular paper condensers which have been especially designed for 85 degree C. applications.

Known as the Type 85LPT series, the units are built into phenolic-impregnated tubes with plastic end-fills.

NIAGARA IS "HOLDING the LINE" ON PRICES!

NIAGARA — ONE OF AMERICA'S GREAT ELECTRONICS STORES

TRANSFORMER BARGAINS

	PLATE	
511-T1	330-0-330 600MA	$5.75
D-161913	2500V 4MA. (TV or Scope)	3.95
GK9126	612-593-0-593-612V 200MA	9.95
	FILAMENT	
T-2	2.5V 10A	$4.95
528049	5 VCT-3A, 5VCT-10.5A, 6.3 VCT-3.5V	4.50
475-T201	5 VCT-13A	5.95
P-4091	7.5 V-5A	2.49
D-161917	6.3 V-3A, 2.5V-2A	2.85
	MODULATION	
ARC-3	807 R.F. to PP 6L6 Mod.	$2.49
A-3856	200, 500 Ohms to 5, 6, 7, 8, 9, 10 K. Ohms, 150 MA.	3.49
T-101	(ART 13) 813 R.F. to PP 211	7.95
900716	5500 Ohms "AB" Mod. (P.P.) to 2600 Ohms R.F. 150W. R.F. (RCA)	4.95
T-47171	"AB" PP 807 to "C" 425V. —240 MA	3.50
	POWER	
511-T2	350-0-350V-150MA., 6.3V.-6A.	$2.15
466-T1R	110-0-110V-225MA., 5V-3A	1.95
PC-110	300-0-300V-125MA., 6.3V-3.8A. 5V-3A	2.95
P-6010	825-0-325V-40MA., 6.3 VCT-2A, 5V-3A	2.49
P-6001	325-0-325 40MA., 5VCT-3A, 2.5 VCT-4A	2.25
P-6009	275-0-275 70MA., 5V-5A, 2.5V-10.5A	3.00
T-47165	135-0-135 90MA., 5V-3A, 5V-3A	2.49
	DRIVER	
A-4203	10,000 OHM Plate to Single Grid	$0.89
A-4404	P.P. 6L6, 2A3, etc., to P.P. Grids	1.65
	OUTPUT	
SP-10	6V6 to 2, 4, 8 OHMS	$0.69
SP-12	P.P. 6V6 to 8 OHMS	.79
T-46255	P.P. Par. 6N7 "P" to 8000 OHMS	1.49
511-T1	6V6 to 8 or 600 OHMS	.85
11868	6V6 to Voice Coil or 500 ⌓ Line	1.89
	INPUT	
T-47368	600 OHM C.T. to 300 OHM Mike	$1.29
	MIKE TO LINE	
T-47369	30 OHM Mike to 600 OHM C.T. Sec.	$1.65
	CHOKES	
L-143	1.72 HY 4 AMPS	$8.95
C-2303	2-3 100 MA.	1.10
475-CH301	3-8 75 MA.	1.25
32584	8 200	2.35
10834	10 180 Dual	3.49
	40 90 Dual	
2647	10 200	2.49
2-RR2	0-60 .05-4 Amps.(10KV)	19.95

TUBES

NEW—BRANDED—GUARANTEED
LARGE STOCK
RECEIVING—TRANSMITTING
INDUSTRIAL

LOW PRICES

Quotation on Request

BANISH INTERFERENCE

with NIAGARA Famous HI-PASS FILTER

Positive protection against interference from amateur transmitters, diathermy, and all other devices generating radio frequency interference below 40 Mcs. Designed for 300-ohm lead-in. No loss in brightness of clarity. **$2.95**
Wired and Tested.....

Postpaid if entire amount is included with order.

OIL FILLED CONDENSERS

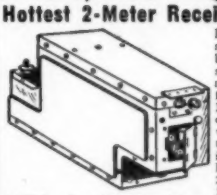
Leading Brand Names
All Brand New—Guaranteed

CAP.	D.C. VOLTS	NO.	NET EACH
.005	15,000	14F322	$ 7.95
.005-.005-.01	10,000	26FH16g2	10.50
.035	10,000	AX1U36	7.50
.02	15,000	14F321	21.95
.01	6,000	143-806	7.50
.15	2,500	26F345	1.10
.2	5,000	C8B2784	2.98
.25	4,000	P9717	3.10
.25	10,000	14F192	19.50
.8	2,500	72041-503	1.25
1	440 AC	K64010	.59
1	2,500	482616-10	2.55
1	3,000	A1089	2.75
1	3,600	C8B3062	2.95
1	5,000	23F49-G2	3.15
1	6,000	T60010GA	4.35
1	12,000	26F628	9.50
2	440 AC	67x21	.79
2	600	A14109-2	.85
2	1,000	23F11	1.10
2	2,000	324-138	2.20
2	3,000	2538-16	4.50
2	5,000	G-8B2784	6.50
2.5-2.5-5	600	C8B1256	1.95
4	330 AC	KG3040	.85
4	400	23F785	.95
4	600	BSR1253-1	1.10
4	1,000	10365	1.75
5	1,000	13765	1.85
6	330 AC	67x7A	.89
6	44 AC	K64060	.95
6	600	P9718	1.75
8	1,000	143-117	2.50
8	2,000	TJU20080G	4.95
10	400	7DB1AE1D	1.25
10	600	10373	1.85
15	1,000	23F19G2	3.95

NEW SHIPMENT!

ARC-5/R-28 (Plus $2.50 BONUS)*

Hottest 2-Meter Receiver Ever Built!



Here is the 2-meter superhet you have been looking for! Absolutely the BEST available today! Tunes from 100 to 156 Mcs. in four crystal channels. (Easily converted to continuous tuning.) Tube lineup is as follows: 717A—R.F., 717A—Mixer, 2-12SH7—1st and 2nd I.F. (6.9 Mc.) 12SL7—Det-AVC-Squelch, 12SL7—1st audio-squelch amplifier, 12A6—2nd audio, 12SH7—R.F. Osc.—4th Harmonic Gen., 717A—Trip. 12th Harmonic Gen., 717A—Dblr.—12th harmonic gen. A highly desirable superhet, made of rigidly inspected parts and contained in a louvred aluminum cabinet measuring 7 5/32" x 4 7/8" x14". Complete with all tubes in original sealed cartons..... **$29.95**

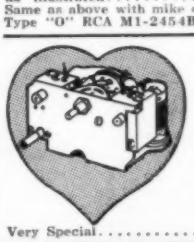
***FOR A LIMITED TIME ONLY!**

with each order for ARC-5 R-28 Receivers, one copy of Vol. 2 "Surplus Radio Conversion Manual" (Regular price $2.50) will be shipped at no additional cost! This volume contains circuit diagram and full description of above receiver, plus a wealth of additional conversion data on many other popular items of surplus equipment. ACT NOW, for YOUR $2.50 BONUS!

10 MILES WITHOUT BATTERIES!

RCA SOUND POWER PHONES

RCA No. M1-2475 Navy Type "Q". You can actually hold two-way conversations over wired circuits up to TEN MILES with these Sound Power phones. Any number of these units may be paralleled on same line without loss of power. Ample volume—excellent tone quality—rubber cushioned earphones, mouthpiece microphone attached. Massive construction, multiple adjustments, 22-ft. rubber cord, push-to-talk switch, navy waterproof plug. Ideal for TV antenna installations, fieldtests, hunting, mining, games, etc. Cat. No. N-300. Your Cost, each unit, comprising 1 pair headphones, microphone, cord and plug, as illustrated..... **$9.95**
Same as above with mike on chest plate. Type "O" RCA M1-2454B..... **$4.95**



HEART OF THE BC-221 FREQ. METER

This VFO Sub-Assembly used in BC-221 Freq. Meter, FULLY WIRED and mounted on sturdy aluminum sub-chasais, ready for installation. Brand new—in original packing, **$4.95**
Very Special.....

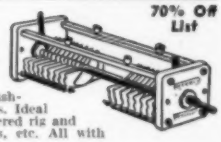
EQUIPMENT SPECIALS

ALL QUANTITIES LIMITED

Ferris 18c Sig. Gen. L.N.	$499.95
Bendix Ta-12c Exc.	39.95
BC733D Vy Good.	14.95
ATA-CBY-52232 2.1-3 Xmtr—New	14.95
BC-652A 2-6 Mc Rcvr. New	39.95
DM40A 12 V. Dyn. for Above. New	4.95
DM42A Xmtr Dyn. Oversea Crated. New	19.95
Sig. Gen. I-126. Vy. Gd.	125.00
RS25-3 Rcvr. Vy. Gd.	29.95
BC-605D Amplifier—New	5.95
AVT-23 Transmitter—New	34.95
ID-93/APG-13A Scope. New	39.95
SCR-522 ("e" Rcvr.) Vy. Good	75.00
PE-103. Exc.	24.95
PE-103 Connecting Cables	4.95
ART-13 Exc.	175.00
BC-221 Freq. Mtr. Exc. Cond.	75.00
ATD Xmtr. New	49.95
Dyn. for Above	24.95
ATD Spare Parts Kit	19.95
BC 906c Freq. Mtr.	32.50
GYRO FLUX GATE Comp. Amplif. New	14.95
BC 439 Freq. Meter	19.95
PE-103 Dynamotor—Exc.	24.95
PE-104 Vibrator Supply, New	19.95
Radio Compass-Army or Navy, Exc.	24.95

Split-Stator Condensers

70% Off List



Popular Split Stator Variables at unbelievable low Prices! Well Built, low loss ceramic mounted with bushings at both rotor ends. Ideal for V. F. O., low powered rig and exciter units, receivers, etc. All with ¼" Shafts.

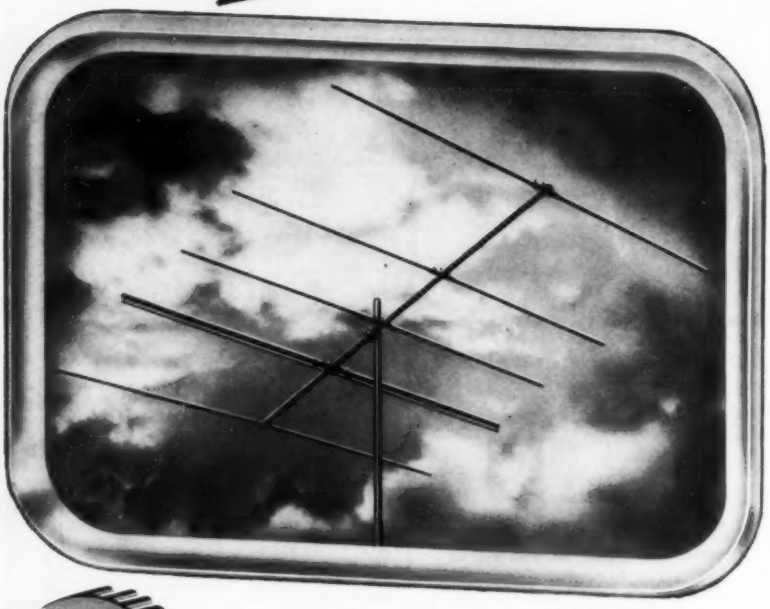
Capacity	List Price	Your Cost
15-15	$3.80	$1.14
20-35	3.95	1.19
27-27	4.10	1.23
35-35	4.30	1.30
75-75	4.80	1.44

IMPORTANT NOTICE: **Minimum Order $5. Quantity prices on request. All items in stock now—subject to prior sale—prices subject to change without notice. 20% Deposit with orders unless rated. All prices F.O.B. our N.Y.C. Warehouse.**

NIAGARA'S GUARANTEE of Satisfaction
All items ordered must meet with full approval or your money back!

Niagara Radio Supply Corp.
Dept. N-41
160 Greenwich Street, New York 6, N. Y.
Phone Digby 9-1132-3-4

OFTEN COPIED —NEVER EQUALED



TURN TO

MOST POPULAR

MOST POWERFUL

EASIEST TO INSTALL

The One and Only
VEE-D-X "JC" YAGI

The Vee-D-X "JC" is by far the world's most popular Yagi. It outperforms and outsells all others. It is the pioneer pre-assembled Yagi — and still by far the best. Provides powerful signal at lowest cost . . . with minimum installation time. Why accept inferior copies when you can get the one and only "JC" Yagi?

HERE IS YOUR GUIDE TO THE WORLD'S FINEST ANTENNA SYSTEMS

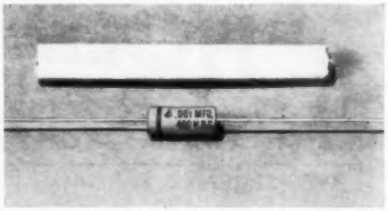
It's the big new 1951 VEE-D-X catalog — a single source for all antenna requirements. For your copy write to The LaPointe-Plascomold Corp., Windsor Locks, Connecticut.

VEE-D-X

THE WORLD'S MOST POWERFUL ANTENNAS

They are designed for continuous operation at their rated d.c. voltages.

Currently these tubulars are available in from .001 μfd. to .5 μfd. at 200



volts; .001 μfd. to .5 μfd. at 400 volts; and .0001 μfd. to .25 μfd. at 600 volts. A data sheet covering the new Type 85LPT series is available from the company.

"JIFFY CLIPS"

Jiffy Clip Mfg. Co. of 128 Clinton Ave., Huntington, Long Island, New York is currently in production on a new type of test probe which features a unique gripping tip.

Designed for radio and television technicians, hams, and industrial workers, the new probe eliminates the need for accessory leads of the spring jaw type and leaves the worker's hands free to perform related procedures.

The spring clip is of phosphor bronze while the probes come equipped with 48 inches of kinkless rubber-covered copper wire. A choice of phone-tip, banana tip, or spade lug is offered.

The manufacturer claims foolproof operation of these units. The grip tip is operated by pressing it onto the work and released by twisting it off. The unit is guaranteed not to pop off.

A brochure giving complete details on the new test probes, prices, and application data is available on request. Your request should be sent direct to the company at the above address.

"G" SERIES CRYSTALS

The James Knights Company of Sandwich, Illinois is now marketing a new line of crystals which have been designated the Series "G".

The new units employ a glass envelope for hermetic sealing. This type

of construction is said to result in higher crystal "Q" and freedom from the effects of supersonic reflections.

At the present time the new crystals are available only in limited quantity and only in the 90 to 200 kc. range but it is planned to expand production

and use the same mounting technique on high frequency crystals.

Inquiries on these new crystals should be addressed direct to the company.

RECORDING TAPE

Jensen Industries, Inc., 329 South Wood Street, Chicago 12, Illinois, has entered the recording tape field with its new "Acoustic Tape."

The new tape is available in either plastic or paper base on 600 and 1200 foot plastic reels. The company claims that the new tape provides high fidelity with low distortion and noise.

Literature and additional details are available from the company.

—30—

International Short-Wave

(*Continued from page* 62)

England) *World Radio Handbook* lists schedule for this one as 0600-0700, 1200-1430.

Belgian Congo—At the time this was compiled, OTC2, Leopoldville, had returned to 9.767 from 9.800 (where it had suffered severe interference, particularly from c.w.) for the evening (EST) program which closes 0100; 9.767 appears much the better channel; evidently, OTC2 is now using 9.767 for both afternoons and evenings (EST). (Balbi, Calif.; Stark, Texas; Lane, South Dakota; Bellington, N. Y., others)

Brazil—Radio Sweden says *Radio Journal do Commercio*, Recife, Pernambuco, can be heard in Sweden on 15.130 from around 0400.

British New Guinea—VLT7, 9.52, Port Moresby, noted with mixed voices singing around 0130, then commentary in native; some QSB. (Winch, Calif.)

Bulgaria—Radio Sofia, 7.671, noted recently in *English* 1500-1530 and 1630-1645; however, the station announced daily *English* broadcasts for 0130, 1500, 1615. (Pearce, England)

Canada—Latest International Service schedules of the CBC are listed—*European Service*—0850-1130, CKNC, CKCX; 1130-1545, CKNC, CKCS; 1545-1600, CKCS; 1600-1645, CKCS, CKLO; 1645-1700, CKLO; 1700-1730, CKLO, CKRZ; 1730-1745, CKLO; 1745-1830, CHOL, CKLO. *Australasian Service*—2330-0005 (*except* Sat., Sun.), commentaries from the U.N., CKLX, CHOL; 0340-0450 (Sun. and Wed. *only*), CHOL, CKLO. *Caribbean and Latin American Service*—1850-2130, CKCX, CKRA; 2130-2235, CKCS, CKRA; *English* is at 2100-2130. *North West Territories* (Northern Messenger)—Sun. *only* at 2320 to approximately 0005 (sign-off varies), CKLO, CKOB. Channels are CKNC, 17.82; CKCS, 15.32; CKCX, 15.19; CKLX, 15.09; CKRA, 11.76; CHOL, 11.72; CKLO, 9.63; CKOB, 6.09, and CKRZ, 6.06.

Cape Verde Islands—CR4AA, Praia, has moved from 5.8925 to 5.9278 (measured), says Oskay, N. J.; heard around 1620. Programs are all-Portuguese and closedown is 1700 when signs with "A Portuguesa."

Valuable guides for television technicians

Just published!

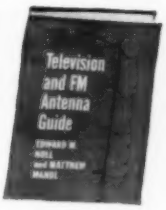
MOVIES FOR TV

This complete, practical book gives you all the information you need to choose the best equipment, operate it most efficiently, and make the most effective use of movies on TV programs. It explains the operation of all leading makes of cameras, projectors, sound and kinescope recording equipment, different types of lenses, etc., giving the advantages, disadvantages, and relative costs of each. It shows what may go wrong and how to avoid trouble, what type of picture is good on television and what is not, how to light movies for best TV reception, how to insure good shots on location, combine live scenes with movies, produce special effects, titles, newsreels, different types of commercials, and much else that will be of utmost practical aid to station personnel and program planners. *By J. H. Battison.*

A practical how-to-do-it guide for technician and program director alike.

CHECK THE ONES THAT CAN HELP YOU MOST AND SEE THEM ON APPROVAL

TELEVISION & FM ANTENNA GUIDE



This excellent handbook will save you much testing and readjusting and insure the best reception from any antenna system. It gives you the characteristics, dimensions, advantages and disadvantages of all VHF and UHF antennas and allied equipment, including heretofore unpublished information on new types recently tested by the authors. It tells how to determine the right type of antenna for a specific location, locate space loops, determine signal strength, etc.; how to mount various types of antennas on different kinds of roofs or window sills; how to minimize noise and avoid standing waves in transmission lines, and all other installation procedures. Handy tables give comparative data, and there is full, clear instruction in all fundamental antenna principles. *By Noll & Mandl.*

How to get the most out of the antenna system at any location.

Outstandingly helpful references

TELEVISION FOR RADIOMEN

The outstanding book on television for servicemen. Explains in clear, non-mathematical terms the operating principles and function of every part and circuit in today's TV receivers, and the chief principles of transmission. Complete, practical instruction in installation and alignment procedures, testing equipment and how to use it, adjustment, and trouble-shooting. *By E. M. Noll.*

RADIO & TELEVISION MATHEMATICS

This unique handbook of 721 problems and solutions shows you what formulas to use, what numerical values to substitute, and each step in solving any problem you are likely to encounter in radio, television, or industrial electronics. Conveniently arranged and fully indexed for quick reference. *By Bernhard Fischer.*

USE THIS COUPON

to get FREE examination copies. If you're not fully satisfied, you may return them without further charge

The Macmillan Company, 60 Fifth Avenue, New York 11

- ☐ Movies for TV $4.25
- ☐ Television & FM Antenna Guide. $5.50
- ☐ Television for Radiomen $7.00
- ☐ Radio & Television Mathematics $6.00

Please send me the books checked. I will either remit in full or return the books in 10 days.

Signed .....

Address ..... N

40 MC TO 220 MC TV AMPLIFIERS

SPECIFICATIONS

- **BANDWIDTH** 40 MC—220 MC
- **IMPEDANCE** 200, 52 and 72 ohm unbalanced, 300 ohm balanced
- **GAIN**.....20 db
- **OUTPUT VOLTAGE** 4 volts RMS maximum
- **RESPONSE** ± 2 db over bandwidth
- **LIST PRICE** $366.00 f.o.b. Cambridge, Mass. Trade Discounts Available

With the Model 212TV Amplifier—SKL — introduces for the first time a single broad band booster capable of amplifying all 13 television channels simultaneously. Because of its stability and reliability — a tube failure means only a slight loss of gain, not amplifier failure — the Model 212TV Amplifier can be safely left unattended for long periods of time. Its low noise level, high output, and low impedance make the Model 212TV Amplifier ideal for television distribution systems in hotels, apartment houses, sales rooms and television stations and manufacturers' plants.

Write today for further information

SKL SPENCER-KENNEDY LABORATORIES, INC.
186 MASSACHUSETTS AVE., CAMBRIDGE 39, MASS.

REK-O-KUT presents a New

Continuously Variable-Speed Turntable of Broadcast Quality

Plays at any speed from 25 to 100 R. P. M., without "wow!"

Speed can be varied while in operation to produce sound effects.

Now for the first time . . . a continuously variable turntable of Broadcast Quality at a popular price. Ideal for record collectors, musicians, singers, disc jockeys, broadcast stations, music schools, dance studios, skating rinks, gymnasiums, etc. Plays through amplifier, radio, TV set or phonograph. Operates on 50 or 60 cycles.

Model CVS-12 (illustrated)
Chassis, motor and turntable . . **$84.95 net.**
Model CVS-12P, mounted in portable case with 16" dual stylus pickup . . **$124.95. net.**

★★★★★★★★★★★★★★★★★★★★★★★★★★★★

3-Speed 12" Transcription Turntable

Recommended by outstanding music critics. Induction-type motor designed for smooth, quiet, vibration-free operation. 3 speeds, 78, 45 and 33⅓.

Model LP-743 . . . . . $54.95 net.

★★★★★★★★★★★★★★★★★★★★★★★★★★★★

Write for Illustrated Catalog of REK-O-KUT Line of Hi-Fidelity Recording Instruments, Phonographs, Transcription Tables, Accessories.

REK-O-KUT CO.
38-05 QUEENS BLVD., LONG ISLAND 1, N. Y.

ADSON FOR VALUE!

SERVICEMEN! STUDENTS! HOBBYISTS!
Now, More Than Ever, Arkay Radio Kits Are Your Best Buy for Value and Quality!

With Arkay you get latest design circuits and top quality parts that assure long trouble-free performance—a kit designed to equal ready-assembled units. Every kit comes with large, schematic, pictorial diagrams and step-by-step instruction manual.

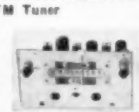
ARKAY 5-Tube Superhet Kit

This streamlined receiver provides crystal-clear reception thru entire tuning range of 550 KC to 1600 KC. 5-tube improved superhet circuit. 115V AC-DC. Full size Alnico PM speaker. Complete with handsome cabinet and all tubes.
KIT MODEL S-5 $14.95

ARKAY 2-Band 5-Tube Receiver Kit

High quality 2-band kit to receive domestic AM signals and foreign short waves. Tuning ranges: 550 KC to 1600 KC and 5.8 MC to 18 MC. Equipped with high gain coils. Powerful 5" Alnico V PM speaker. Complete with handsome cabinet and all tubes.
KIT MODEL S-5X . $17.95
KIT MODEL S-6X, 2-Band, 6-Tube Receiver $18.95

ARKAY 6-Tube FM Tuner



Brings in full range of FM stations from 88 MC to 108 MC. 6-tube circuit provides no-drift tuning for steady reception. Equipped with own volume control and all tubes.
MODEL FM-5. Factory Wired and Tested $31.95
KIT MODEL, Ready to Assemble . $21.95

ARKAY 3-Way Portable Receiver Kit—5 tube radio for portable battery operation and AC-DC house use. 550 KC to 1600 KC. Smartly designed leatherette case with modern grille and slide rule dial. 5" Alnico V speaker.
KIT MODEL 3W10A $18.45

Satisfaction guaranteed. Send check or money order. 25% deposit with C.O.D. All orders shipped within 24 hours, F.O.B. New York. Please include postage.
Write Dept. 104

ADSON RADIO & ELECTRONICS CO.
221 Fulton Street, New York 7, N.Y.

Ceylon—The Commercial Service of *Radio Ceylon*, 9.52, noted 1930-2027 sign-off. (Balbi, Calif.)

Chile—CE1174, 11.740, Santiago, noted 2340, good level; at 2345 announced as *"Radio Nuevo Mundo,"* continued with music. (Ferguson, N. C.)

Colombia—HJCF, 5.96, good level signing off 2303. (Bellington, N. Y.) Bogota noted signing on 1300 on a Sunday on 6.200; heard there nightly with strong signal. (Fox, D. C.) Bogota has been noted recently on 5.963 with *English* at 2205. (Stark, Texas)

HJFA, 4.864, Pereira, noted 2030 with music; HJCW, 4.945, Bogota, heard 1950 with music, airlines QRM; HJGF, 4.845, Bucuramanga, noted 2025 with music; HJBB, 4.815, Cucuta, heard around 2000 with music. (Russell, Calif.)

HJCQ, 4.959, Bogota, noted 2255. (Treibel, Washington State)

HJCQ, 11.68, Bogota, noted with Spanish news in progress at 1805. (Bellington, N. Y.)

Cuba—COBZ, 9.0335V, Havana, measured here 0720 recently; previous measurement was 9.0256; apparently has shifted to avoid severe CWQRM present on former frequency. (Oskay, N. J.) Stark, Texas, also noted this one higher than usual of late, although it still announces as on 9.030.

COBL, 9.833, Havana, comes in fine after 0900. (Saylor, Va.) COKG, 8.955, Santiago, signs off with *English* announcement 0035. (Russell, Calif.)

Curacao—PJC2, 5.014.3, Willemstad, measured here at 1825; assigned and usual channel is 5.010 (Oskay, N. J.)

Czechoslovakia—Prague, 9.504 and 11.840, noted signing on 1015 with musical program. (Pearce, England) The 6.17 channel noted with *English* 1715-1730; mentioned 11.875 also. (Bellington, N. Y.) Noted on 11.875 with news 0715. (McWalter, Scotland)

Denmark—Copenhagen's OZH, 15.165, still has broadcasts 0500-0600 on Tue., Thur., Sat.; news 0552. (Pearce, England)

Dominican Republic—HI4T, 5.970, and HI2T, 9.735, parallel, still close 0000. (Grove, Ill.) HI8Z, 5.030, Santiago, noted 2020 with music. (Russell, Calif.)

Ecuador—HC1AC, 6.21, Quito, noted with station announcement in Spanish 2207. (Bellington, N. Y.)

Egypt—There is a "vague" report that the Egyptian State Broadcasting System has added a new short-wave transmitter for its "morning" and "afternoon" transmissions, operating around 7.770, reported heard at 1330. (Radio Sweden) *Report not confirmed.*

Tanczos, Ohio, reports SUX, 7.868, Cairo, with news in Arabic 1618.

England—At the time this was compiled, BBC schedules for the Western Hemisphere were listed—*North American Service* (Canada, USA, Mexico), 1045-1215, 17.790; 1300-1500, 15.140; Mon.-Fri., 1415-1545, 9.825; Mon.-Fri., 1545-1700, 9.825, and 1615-1700, 6.110. Special Program for the Falkland Islands (Sun. *only*), 1115-1145, 21.710, 15.260. Special Program for the West

CRYSTALS Low Freq.

FT241-A. Holder ½" Pin spacing, for ham and general use. Xtal controlled. Signal Generators, marked in army Mc harmonic frequencies—Directions for deriving fundamental frequencies enclosed. Listed below by fundamental frequency, fractions omitted.

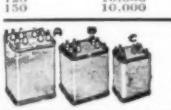
370	396	420	446	487	514	447
372	397	422	458	488	515	448
374	398	423	459	490	516	450
375	400	424	461	491	518	451
376	401	425	462	492	519	453
377	402	427	468	493	520	454
379	403	429	469	494	522	455
380	404	430	470	495	523	456
381	405	431	472	496	525	457
383	406	433	473	497	526	463
384	407	434	474	502	527	465
385	408	435	475	503	529	498
386	409	436	476	504	530	500
387	411	437	477	505	531	501
388	412	438	479	506	533	538
390	413	440	480	507	534	540
391	414	441	481	508	536	
392	415	442	483	509	537	each
393	416	443	484	511	each	
394	418	444	485	512	**69c**	**$1.49**
395	419	445	486	513		

ATTENTION CAP MEN!!!

BC-429 receiver, 3-gang TRF non-radiating receiver, designed for aircraft use. Complete with tubes and C-439 tuning unit covering 200-400 kc and 2500-4700 kc, less pwr sup.. . **$3.95**

1% PRECISION RESISTORS

.6	128	10,000	$4,000
1.01	250	12,000	30c ea.
5	300	12,000	10 For
5.05	430	17,000	$2.99
10.1	468	17,300	100,000
18	800	20,000	120,000
25.5	920	25,000	120,000
50	1100	30,000	150,000
75	4300	33,000	220K
82	5000	40,000	250K
120	7500	55,000	40c ea.
125	8500	57,000	10 For
128	10,000	75,000	$3.50
150	10,000	1 Meg.	75c ea.



TOP TRANSFORMER BUYS

These XFRMRS are Army Spec. All Underrated.

Comb. Transformers—115V/50-60 cps Input

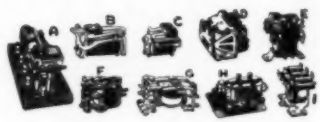
Item	H.V.	Amp.	Filaments	Price
CT-861	2100VCT	.175	7.5VCT/4A, 2.5V/10A	$10.95
CT-075	265VCT	60 MA	24/.3A, 6.3/6A, 6.3/.45A	1.95
CT-142	645VCT	.060	5V/2A,6.3V/1.2A	4.25
CT-825	360VCT	.340	6.3VCT/3.6, 6.3VCT/3A	3.95
CT-076	600VC	.100	2 x 12.6V/1	1.95
CT-626	1500V	.160	2.5/12, 30/100	9.95
CT-15A	350VCT	.070	6.3/.6, 6.3/1.8 3 lbs	2.95
CT-071	110V	.200	33/200, 5V/10, 2.5/10	4.95
CT-378	2300V	4 MA	2.5/2	6.95
CT-367	580VCT	.050	5VCT/3A	2.25
CT-721	550VCT	.100	6.3/1, 2.5VCT/2	2.95
CT-99A	2x110VCT	.010	6.3/1A, 2.5 VCT/7A	3.25
CT-91A	726V	.100	5V/3A, 6.3/3.5	3.25
CT-441	50V	.200	5V/2.4, 5V/1.2	2.29
CT-408	350VCT	.026 MA	5V/3A	2.75
CT-931	585VCT	.086	5V/3A, 6.3V/6A	4.25
CT-610	1250	.002 MA	2.5V/2.1A, 2.5V/1.75A	4.95
CT-137	350VCT	.026 MA	5V/3A	2.75
CT-102	1080VCT	.055	25V/3A,6.3V/1.8A,6.3V/1.2A	5.95
CT-866	330V	.065	6.3V/1.2, 6.3V/600 MA	1.75
CT-319	330VCT	.085	5V/2, 6.3/7.5, 6.3/3	3.25

Filament Transformers—115V/50-60 cps Input

Item	Rating	Each
FT-852	23V .35A	$ 79
FT-599	78V/.300, 6.3V/2A	1.95
FT-719	1.3V/6A	.79
FT-029	13.5V/1.11A	.79
FT-367	5VCT/3A, 58VCT/40A	1.10
FT-346	5VCT/13/5, 5VCT/6.75, 5VCT/6.75	5.95
FT-781	866 Trans. 2 x 2.5/5A	2.25
FT-511	3.4V/300A, 7½H x 10" x 5" 7W	12.95
FTG-31	2.5V/2.5, 7V/7A (Tape @ 2.5V/2.5A), 16 lbs	9.95
FT-674	6.1V/1.5A	1.10
FT-157	4V/16A, 2.5V/1.75A	2.95
FT-391	6.4V/3A	1.10
FT-736	2 x 6.3VCT/3.2-1.2A	1.49
FT-461	2 x 6.3VCT/1A	1.10
FT-899	2 x 5 V/5.5A 29000 Rms	22.95
FT-418	6.3VCT/1A, 6.3VCT/7A	1.95
FT-735	6.3VCT/5A, 6.3VCT/1A	1.79
FT-101	6V/25A	.79
FT-738	6.3VCT/1A, 5V/2A	1.69
FT-774	6.3V/1.6A	.79

Plate Transformers—115V/50-60 cps Input

Item	Rating	Each
PT-976	Auto: 120VCT/10 MA	$ 0.69
PT-31A	2 x 300V/5 MA	.79
PT-46A	4080VCT N.L. 3⅝ to 1 8" H x 6" W x 7" L 20 lbs	29.95
PT-033	4150V/400 MA 11½ x 9¼ W x 9" D 70 lbs	49.95
PT-75-2	3780/3446/3112VCT/77 MA	10.95
PT-28-1	4600VCT/077	12.95
PT-403	Auto: 70V/1A	2.29
PT-160	1120VCT/770 MA, 590VCT/82 MA, 25 lbs	24.95
PT-170	Auto: 156/146/137/128-.71A	3.29
PT-139	42V/46V/50V/55V/15.2A 7¾x7" W x 6¼" H	10.95
PT-31A	2 x 300V/5 MA	.79
PT-976	120VCT/10 MA	.79
PT-67-1	62V/3.5A	2.95
PT-12A	280VCT/1.2A	2.95
PT-997	78V./.00754 KVA, AUTO	1.49



RELAYS

Description	Ohms	Mfr.	Cat. No.	Price
2 amp. contacts 24 VDC DPST (NO) SPDT	700	WE	D170067	$1.10
24 VDC 3 amp. contacts DPDT Ceramic	100	GE	CR2791-D101F3	1.10
SPDT 2 amp. Cont. 24 VDC	....	Allied	452-1127-2	.95
SPST (NO) 24 VDC 6 amp. Cont.			7368	
DPST (NO) 6A Cont. 6 VDC	33		694391	.95
DPDT 28 VDC 3A Cont.	350	Allied	5.E.2	1.10
SPDT 28 VDC 2A Cont.	300	Allied	BJ P-8-4	.95
DPST (NO) 2A Cont. 24 VDC	350	Allied	452-1298 TSL-C	.95
DPDT 24 VDC 5A Cont.	200	Allied	BJ-E8677080-2 P84	.95
DPST (NC) 2 A Cont. 24 VDC	260	Allied	BA-11755-8 BO 6D35	1.15
DPST (NO) 2A Cont. 12 VDC	400	Allied	BUX27	.95
TPDT 26 VDC 10A Cont.	200	Allied	P-9-4	.95
SPDT DOUBLE BRK. 12A Cont. 28 VDC	200	Allied	CC029260 K55910-L11	1.15
SPDT 3A Cont. Less Cover	....	FTR.	Box-48	1.15
DPST (NO) 4A Cont.	490	....	AD 1656	1.45
SPST 24 VDC For T816/APN 5A Cont.	526	Allied	GR206 452-1084 227586-24	.95
DPST (NC) SPDT 3A Cont. SPDT SPST (NO)	5800	WE	K 301 D169615	1.10
3A Cont.	1300	WE	D169316	.95
DPST (NO) SPDT 3A Cont.	700	WE	D170067 CR2791B100	.95
DPDT 2A Cont.	150	GE	F3	.79
DPDT 12V 10A Cont.	44	Leach	1067-490	1.29
DPST (NC) 24 V 5A Cont.	425	Leach	1025-8NBF	1.29
DPDT 24V Ceramic 10A Cont.	160	Leach	1077-BF K35J367-2	1.29
DPDT 2A Cont.	150	GE	CR 2791-B100F3	.79
4PST (NO) 24V 10A Cont.	....	GE	CR2791-G100K4	.99
SPDT 3A Cont.	150	GE	CR2791-B100F3	.79
TPDT 2A Cont.	150	GE	CR2791-B100J3 For BC312-314-	.95
DPST (NO)	....	CP Claire	342 BK13	1.50
TPDT 2 amp. Cont.	4850	WE	D171258	1.20
DPDT (DPST) (NO) 2A Cont.	....	RBM	For ARC 3 55530	.70
SPDT, BRK MAKE 2A Cont.	300	Allied	73BS7 BU Type	.80
DPDT 12V 3A Cont.	112	WE	B0303O9	1.20
SPST AIRCRAFT 24V 100 amp. Cont.	....	Leach	5058	.....
24V AIRCRAFT 100 amp. Cont.	....	Leach	7058-24	.....
DPDT 24V 3A Cont.	....	Allied	5819-103 For Ant. BC442	.95
SPDT (SPST) (NO)	....	....	274N-ARC 7735	.....
Dual SPST (SPST) (NO) 24V 100A Cont.	100	Aircraft Leach	5023-C-G17	.....
DPDT 24 VAC 3 amp.	....	Allied	P75 For AN/TPS-1B	1.45
Timing SPST 20-29V 25A Con. Relay	....	GE	CR2791-J105A53	3.49
SPDT, SPST (no) 115V 60 Cy. 2A Cont.	100	Claire	RP649B A69 41 2Z7588-80 For BC 303B	1.95
DPST (NO) 14V 15A Cont.	.....	Price Auto	X-20-A AQA H77318-2	1.49
DPST (NO) 70 VDC .25A Cont.	1000	Elect. Pot Brum	For BD62-B	1.50
DPDT 2A Cont.	1000	Claire	A 3098 For GN 45	.95
DPST (NO) 6V 10A Cont.	30	Radionic	G 189	1.95
24V Hiamp Cont.	....	Cotter	Hammer 6041 H24A	.....
SPDT, SPST (NO) 21.5V 2 amp. Cont.	6500	Auto Elect.	For T19B/ H70984 H79843	.95
SPST (NO) 2A Cont.	6000	....	H77312 CR2791	.95
DPDT. 2A Cont.	100	GE	D100F3	1.29
DPDT 24V 10A Cont.				
DPDT 10A Cont.	200	Allied	BO635	1.15
Dual Coil	....	GM	71-5015 13038	1.20
4PST (NO) 24V 10A Cont.	....	GE	CR2791-G100k4	1.75
SPST (NO) (DB 1 Brk) SPST (NO) 24V 10A Cont.	42	Leach	1224-322	1.59
DPDT 28V 2A Cont.	50	Allied	P-8-4	.95
..... Dual w/arm	400	....	H704482	.95
..... w/arm	400		H70255-4	.95
SPST (NC) 5A Cont. Dual Coil	200	GM	12917-1 K52A421 244A6	1.20
SPDT 2 amp. Cont. Plug in.			RE5667 For PE75-T	.95
SPST (NO) 10Amp. Cont.	.016	Kohler	7110-2	1.50
SPST AIRCRAFT 24V High amp. Contact	....	CH	32324 type B4	.....
AIRCRAFT 24V 100 amp. Contact	....	SQD	9360 CN2 7472661-1	.....
DPDT 2 amp. Cont.	250	....	CR2791-G110F2	.50
DPDT 24V 3 amp. Cont.	200	Allied	P45	.95
DPST (NO) 6 VDC 6 amp. Cont.	33	Gentelev.	For GN45B G189	1.50
3PST (NO) SPST (NC) 2 amp. & 4A Cont.	490	....	452-1085 GR207	.95
DPDT 9-14V 5 amp.	....	Allied	K5819-LO8	.95
SPST (NO) DOUBLE BRK. DUAL RELAY 24V 10 amp. Cont.	160	Leach	1221-V 452-1155	1.29
DPDT 3 amp. Cont.	....	Allied	BJ-P-10-4 For GN45A	.95
DPST (NO) 6V 6 amp. Cont.	33	Burke For	34475 BC330 R-970-	1.95
DPST (NO) 48V 3 amp. Cont.	1300	Auto Elect.	D2A AQA	.95

AUDIO TRANSFORMERS

ITEM		
AT666	Input 6 ohms: 250K ohms	$0.79
AT SUB	Multimatch Subouncer 200 ohms 15K ohms C. T.: 100K ohms/20K ohms	.69
AT070	Input to Grid 250 ohms: 60K ohms HI FI	1.19
AT566	Input to Grid, 500/200 ohms: 50K ohms	.95
AT227	Output to line, 7500K 500 ohms CT 200—5keys	1.45
AT353	Output PP 6L6 to 300/20/12/16 ohms 25 Watt	2.95
AT871	UNIV. Output, HI FI, Pri 20K ohms nec. 15/7.5/5/3.75/1.25/500 ohms	2.79
AT554	Interstage, 10K ohms: 250K ohms 15db Level	1.95
AT765	Input 600 ohms to 50K ohms	.79
AT707	Interstage ouncer 10K ohms:125/125K ohms	.79
AT449	Driver 5K ohm to 4K ohm PP6L6 to PP805 Class B	3.89
AT21	Dual XFRMR 300 ohms: 300 ohms and 600 ohms: 250K ohms	1.35
AT383	Output 8500 ohms: 19 ohms 25W	1.79
AT415	Output 18K ohms CT to Line 125 ohms 175W	2.95
AT649	Input. Line 500 ohms T Grid, 75K ohms	.79

MANY OTHERS

DYNA-MOTORS AT SURPLUS PRICES

Type	Input Volts	Input Amps.	Output Volts	Output Amps.	Radio Set
PE88	28	1.25	250	.060	RC 36
DM416	14	6.2	330	.170	RU 19
DY-2/ARR-2	28	1.1	250	.060	ARC-5
DM36	28	1.4	220	.080	SCR 508
DM25	12	2.3	250	.050	BC 367
	28	1.25	275	.070	BC 348
DM33A	28	7	540	.250	BC 456
DM42	14	46	515	.110	SCR 506
			1030	.050	
			2/8		
PE101C	13/26	12.6	400	.135	SCR 515
		6.3	800	.020	
BD AR 93	28	3.25	375	.150	
23350	27	1.75	285	.075	APN-1
35CO458	28	1.2	250	.060	
ZA-0515	12/24	4/2	500	.050	
ZA-0516	12/24	8/4	12/275	3/110	
B-19 pack	12	9.4	275	.110	Mark II
			500	.050	
D-104	12		225	.100	
			440	.200	
DA-3A	28	10	300	.060	SCR 522
			150	.010	
			14.5	.5	
5053	28	1.4	250	.000	APN-1
PE73CM	28	19	1000	.350	BC 375
DM21	14	3.3	235	.090	BC 312
CW21AAX	13	12.6	400	.135	
	26	6.3	800	.020	
			9	1.12	
BD 77KM	14	40	1000	.350	MC 191
PE94	28	10	300	.200	SCR
			150	.010	522
			14.5	.5	

PE 86 DM 32A DY 22 ARC 3 DAG 33A

ELECTROLYTICS
Prong Mount

D. C. V.	Type Cond.
13-15	220-1.20
20-24	110-1.00
26-30	220-1.35
43-45	110-1.25
43-48	110-1.25
50-75	110-1.25
53-60	220-1.50
61-69	320-1.60
64-72	110-1.25
72-87	110-1.25
75-84	110-1.25
88-106	110-1.50
107-129	110-1.65
130-157	110-1.75
130-150	70-1.50
130-180	110-1.85
158-191	110-1.85
161-180	110-1.75
189-210	110-1.95
200-220	110-1.95
270-300	110-2.10
324-360	110-2.40
378-420	175-3.00
432-480	110-2.75
485-540	110-2.85

PORTABLE CASES

Reg. Size Record Player Case. CASE: 3⅛" Plywood Construction 10⅞" x 7" Sq. Cut out for Speaker Door 1⅜" x 1⅝" x 2⅜". Opens on Top. W2/2 Hasp Locks on Side & Carrying Handle.
Dimensions: 20½" x 15" x 8¾".
Covering: Wine or Blue Thin Leatherette.
Hardware: Large Non Rattle Carrying Handle, w/4 Metal Dome Feet.
PRICE **$2.75**

Reg. Traveling Radio Case. Case: 3⅛" Plywood Construction w/shelve inside back-open. Less Front panel 5⅜" x 11⅜".
Dimensions: 10" x 13⅜" x 6¼". Covering: Brown, Blue or Red Leatherette Covering.
Hardware: Large Non Rattling carrying handle w/4 Metal dome Feet.
PRICE **$2.00**

Small Size Record Player Case. Case: ⅜" Plywood Construction.
Dimensions: 10⅛" x 12⅜" x 5½".
Covering: Red & Blue Leatherette.
Hardware: Large Bakelite Handle w/4 Metal Dome Feet.
PRICE **$2.50**

GIBSON GIRL

The Emergency Radio Transmitter. Send S O S signals automatically on 500KC. 150-mile range. No batteries required. Has hand-driven generator, tubes, wire. New. It's only..... **$3.95**

SCR 610
PORTABLE WALKIE-TALKIES
LARGE QUANT. AVAILABLE

All merch. guar. Mail orders promptly filled. All prices F.O.B. N. Y. C. Send MO or Chk. Only shipping chgs. sent C.O.D. Rated Concerns send P.O.

COMMUNICATIONS EQUIPMENT CO.

MIN. ORDER $3.00

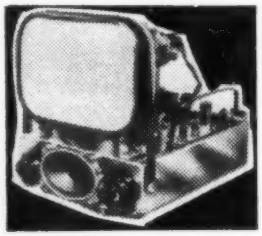
131 Liberty St., New York, N. Y. Dept. N-4 Chas. Rosen Phone: Digby 9-4124

BELIEVE IT OR NOT!

630ts TYPE CHASSIS

Mfg. Licensed Under R.C.A. Patents

30-TUBE CHASSIS



Complete Chassis Including Black Rectangular Picture Tube

1. Best for Fringe Areas.
2. Improved Keyed A.G.C.
3. Full 4 Megacycle.
4. 16 K.V. Output.
5. A.F.C. Sync. Separator Syncrolok.
6. Latest 1951 Features.
7. Focus Coil. Yoke Removeable Plugs.
8. Standard Tuner.
9. Improved Down to 45 Microvolts.
10. Set Equipped Phono Jack.
11. Set uses 70° Deflection Coil.
12. Complete Chassis with Tubes Aligned. Not a Kit.
13. Large 12" Speaker.
14. All Knobs. Channel Selector.
15. Universal Brackets. Tube on Chassis.
16. Free Plastic Mask with Every Set.
17. Free Schematic with Every Set.
18. Free R.M.A. Guarantee on Chassis-Tube.
19. Free—No Extras—Tax Included.
20. Free Delivery on Paid Orders—6 or More.
21. Dumont Tuner F.M. Radio—$10 Extra.
22. Cabinets, Console, 16", 17", 20"—$59.
23. Cabinets, Half Doors, 17", 20"—$69.
24. Cabinets, Full Doors, 17", 20"—$79.
25. Cabinets, Furnished Blonde—Mahogany—Same Price.
26. Dealers, Dist., Mfg., Special Prices 12 or More.

16" TUBE $189

17" TUBE $199

20" TUBE $219

24" TUBE $299

25% with Order Balance C.O.D.
IMMEDIATE DELIVERY
Cash with Order Saves C.O.D. Fees

UPSTATE, 107 Duane, Schenectady, N. Y. Tel. 4-3008

the "*High Quality*"

AUDIO AMPLIFIER

For the Critical Music Lover

- Handsome appearance
- ALL TRIODES for the utmost in naturalness.
- Exclusive Brook circuits & transformers.
- Listening fatigue reduced to a minimum.
- Inputs compensated for any type of phono-pickup, TV, FM & AM receiver.

Write for Technical Bulletin, detailed Distortion Analysis & booklet "Better Listening"

• • • •

Brook Electronics, Inc., Dept. RD-1

• • 34 DeHart Place, Elizabeth, New Jersey

DIAMOND NEEDLES **$9.75** EACH POSTPAID

Let us re-tip your present replacement needle assembly with a DIAMOND tip. Send us your replacement needle assembly *or complete cartridge, if you cannot remove the replacement needle assembly*, to have a diamond tip installed.

At the price of $9.75 each, postpaid, our diamond styli cost you less because we are the *only* manufacturer offering diamond needles direct to the consumer. Without a diamond needle, your valuable records run the risk of damage unless you change needles at least every 20 hours of playing time (especially Microgroove). A DIAMOND tipped needle will last a minimum of 1000 playing hours without causing any damage to your records, while giving you highest fidelity reproduction and NO distortion. Using ordinary needles for the same 1000 hours could cost you as much as $90.00 in needle replacements.

***Here Are The Facts About Our* DIAMOND NEEDLES**

1. 70% of the diamond styli used by broadcasting stations are made at our plant.
2. Our styli are made from whole, natural diamonds—Not chips or splints.
3. Tip radius accurate to plus or minus .0001".
4. Inspected by microscope and shadowgraph to insure high polish and accurate radius.
5. UNCONDITIONALLY GUARANTEED.
6. Prompt return shipment.

Diamond tips made for LP or STANDARD records. Send check or money order with your needle assembly or replacement needle type cartridge (except Pickering cartridges) to:

THE TRANSCRIBER CO.

Diamond Styli Manufacturers

176 Green Street • Boston 30, Mass.

Indies, 1815-1845, 9.580, 6.195. *General Overseas Service*—To West Indies, Central America, South America (north of Amazon), 0530-0800, 15.180, 1815-1700, 11.750, 1700-1815, 9.580, 1700-1815, 6.195, 1845-2200, 9.580, 1845-2200, 6.195; to North America (West Coast), 1015-1115, 11.700, 2100-0230, 9.510; to South America (south of Amazon), 0530-0615, 21.710, 1515-1700, 15.260, 1700-2100, 11.750, 1700-2200, 9.510, 1915-2200, 6.070; to Canada, USA, Mexico, 0600-0815, 11.700, 1700-2200, 9.825, 1700-2315, 6.110.

Ethiopia—Radio Addis Ababa broadcasts *English* programs for more than an hour, beginning 1015, on 9.620. (Radio Sweden)

France—Paris-Inter, 6.200, comes in well in Scotland during musical session at 1030-1100. (McWalter)

French Equatorial Africa—Radio AEF, Brazzaville, noted on 9.960 with call 1330; news in French 1400; call 1415; at 1500 gives time as "9 p.m. Brazzaville Time," and closes in French "until tomorrow evening;" plays "La Marseillaise" before leaving the air. (Pearce, England) Stark, Texas, has noted this one some days as late as 1600 sign-off. Balbi, Calif., says that *Radio AEF*, 17.84, usually signs off 1000 but on Sat. runs to 1100.

French Morocco—Radio Maroc, 6.005, Rabat, has fair signal 0145-0300. (Saylor, Va.) Often noted with music around 1730. (McWalter, Scotland)

French West Africa—Radio Dakar has *new* schedule on 11.895 at 0200-0300, 0600-0830, 1300-1800; on 15.347 at 1400-1600. (Radio Sweden)

Germany—Radio Free Europe, 6.130, still signs on with bell tolling at 1020; program starts 1030; noted leaving air 1800 after calls in various Eastern European languages; bell tolls at 30-minute intervals. (Pearce, England) Leipzig, 9.728, noted with music, then news in German at 0015; played a selection from Strauss before 0100 sign-off; strong in California. (Winch)

Hamburg, 7.29, good 0250 in German by man, possibly newscast; Baden-Baden, 6.32, noted 0148, good signal but severe QRM; popular German songs; woman announcer; Frankfurt, 6.19, heard with German news by man 0203, good level. (Bellington, N. Y.)

Gold Coast—Zoy, 4.915, "This is the Gold Coast Station at Accra," noted with weather forecast, local news, 1245; severe CWQRM; at 1256 played recording and at 1759 call was given by woman, "Closing until 8 a.m." (local time); signed off with "God Save the King." (Pearce, England)

Greece—Armed Forces Station in Central Greece, 6.745, Larissa, noted with *English* program on Thursdays 1530-1545; also heard signing off 0200. Strong signal noted on 7.050 from a Greek Forces Station at 1615. *Radio Macedonia*, 7.950, heard with strong signal at 1500, recordings. (Pearce, England)

Greenland—A Danish listener informs *Radio Sweden* that the power of "minor" stations in Greenland varies from 150 to 600 watts. *Radio Sweden*

says the "minor" (local) radio stations operate on 7.570 and 12.300 and that they carry news from the *Danish Radio* in Greenlandic and Danish. I have no reports that these stations have been heard in USA. According to Swedish sources, OXI, 5.942, Godthaab, now on the air 1645-1715, soon will extend its services, but no details were available at press time.

Guatemala—By this time, TGNA, missionary station in Guatemala City, 6.040 and 9.668, may also have put 11.850 into use. Grove, Ill., and Stark, Texas, point out that while normal sign-off is around 2230, on Wednesdays the "Mailbag" program extends to 2300 or later (sign-off varying).

TGQA, 6.402, Quetzaltenango, noted 2045 with marimba music; considerable CWQRM. (Russell, Calif.)

Haiti—4VBM, 9.660, Port-au-Prince, noted 2000-2025; all-French; music; commercials (including singing commercials); identified at 2015; mentioned Magloire Broadcasting Circuit; weak signal, bad fade, some CWQRM. (Patterson, Ga.)

4VRW, 9.8378 (measured), Port-au-Prince, noted 1845 with popular recordings, announcements in French. (Treibel, Washington State)

4VEH noted on 9.729 at 1830. (Sutton, Ohio) Bellington, N. Y., reports this one on 9.75 at 1745 with organ music. Balbi, Calif., reports it on 9.73 at 1030, and on 9.745 at 1730.

Holland—According to current schedules from Hilversum, the "Happy Station Program" is listed now for *only* Sundays at 0530-0700, 21.48, 17.775, 15.22, 6.025, to Australia, New Zealand, and the Pacific Area; 1100-1230, 15.22, 11.73, 6.025, to South and Southeast Asia; 1630-1800, 11.73, 9.59, 6.025, to South America, Africa, and Europe; and 2130-2300, 11.73, 9.59 to North America. *English* transmissions in the Overseas Service are listed (*weekdays only*) for 0530-0610 to Australia, New Zealand, and the Pacific Area, 21.48, 17.775, 15.22, 6.025; 1100-1130 to South Asia, 15.22, 11.73; 1500-1540 to South Africa, Great Britain, Ireland, and Europe, 11.73, 9.59, 6.025; and 2130-2210 to the United States and Canada, 11.73, 9.59. (Leinbach, N. Y.)

Honduras—HROW, 6.6602, Tegucigalpa, "*Radio Monserat*," noted around 2320. (Treibel, Washington State)

Hungary—*Radio Budapest*, 6.247, noted with good signal around 1930-1955 sign-off. Still asks for reports to Radio Budapest, Budapest, Hungary. (Kroll, N. Y.) Strong in D. C. at 2350 on 6.247 in Hungarian; fair on 9.833. (Fox)

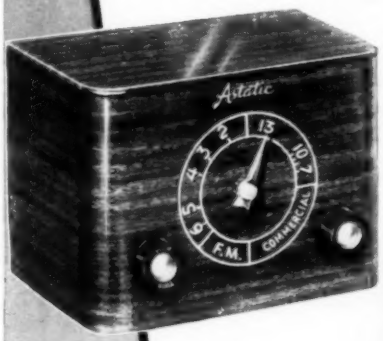
Iceland—Reykjavik's TFJ, 12.175, noted on Sunday at 1115 with call. (Pearce, England) Schedule is Sunday *only* at 1115-1145 in Icelandic for Icelanders abroad; announces "Ut varp, Reykjavik." (*World Radio Handbook*)

India—VUM2, 4.920, Madras, noted with news 1030-1045; VUB2, 4.840, heard with talk 1115. (Pearce, England) The 4.920 channel is fair some mornings here in West Virginia with news 0730.

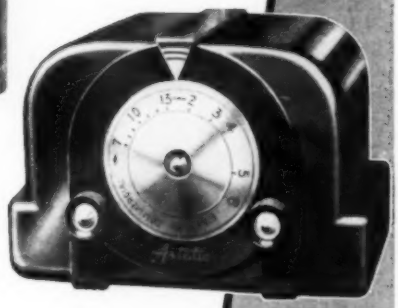
Indo-China—*Radio France-Asie*, Sai-

BEST BEFORE....
NOW EVEN BETTER THAN EVER
Astatic TV and FM Boosters

YES, ASTATIC engineering research has found a way to improve still further its BT Series Boosters, in ability to sharpening quality of TV reception. From the first, these Astatic entries in the low-cost booster field have won top preference of the trade in virtually every instance where performance has been compared. So, it's a matter of yesterday's best made even better today—thanks to constant Astatic research and engineering progress. This continuing search for better methods and products is also your greatest assurance of first quality in phonograph pickups and cartridges, microphones and related equipment.



Model BT-2
List Price
$34.95



Model BT-1
List Price
$32.50

QUALITY FEATURES

1 Mallory Inductuner for continuous variable tuning.
2 High gain, very uniform on both high and low channels.
3 Simplified controls—single tuning knob with continuous tuning through both TV and FM bands.
4 Band width adequate over entire range.
5 Low noise design and construction.
6 No shock hazard to user.
7 Off-on switch for easily cutting in and out of the circuit.
8 Selenium rectifier.
9 Single 6AK5 tube.
10 Provide for either 72 ohm or 300 ohm impedance input and output.
11 Model BT-2 has handsome, dark brown plastic cabinet.
12 Model BT-1 has metal cabinet in rich mahogany woodgrain finish.
13 Large dial face is easy to see in tuning.
14 Model BT-2 has recessed pilot light to show when booster is on.

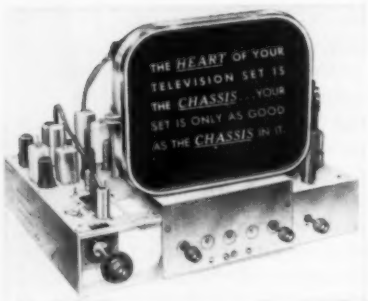
THE *Astatic* CORPORATION
ASTATIC
CONNEAUT OHIO
IN CANADA: CANADIAN ASTATIC LTD. TORONTO, ONTARIO

TRANSVISION

ANNOUNCES

NEW LOW PRICES

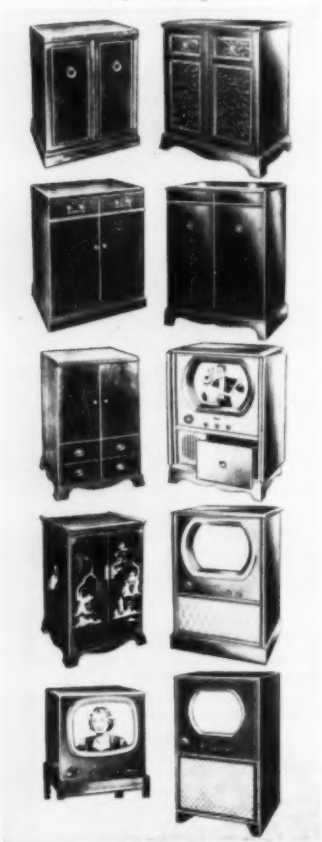
on 17"-20" TV KITS, CHASSIS and CABINETS



SAVE UP TO 50%!

Transvision makes the *finest TV KITS* and *WIRED CHASSIS* that money can buy. *PRICED AMAZINGLY LOW.* Kits are easy to assemble. Give top quality picture and sound. Ideal for both hobbyists and dealers. *BEAUTIFUL NEW CABINETS.*

Write for Catalog RN.



Write for Prices and Details Today!

TRANSVISION, INC.

Dept. RN NEW ROCHELLE, N. Y.

gon, noted lately on 6.11, signing on 0400. (Balbi, Calif.) Dale, Calif., reports an Indo-Chinese station on 6.22 at 0915 with *English* news; may be *"Voice of Vietnam"?*

Iran—According to a *World Radio Handbook* Bulletin, EPP, 3.930, Teheran, is broadcasting a Persian program 1100-1140. This may be the unidentified station reported earlier by Peddle, Newfoundland, on or near this channel.

Ireland—Radio Eireann, 17.840, still has news 1330 to approximately 1350 (sign-off varies); has had QRM from Brazzaville but some words are readable. (Grove, Ill.) Also reported by Ferguson, N. C.

Israel—4X4EA, 6.725, Tel Aviv, "The Jewish Forces Broadcasting Station," noted with varied recordings at 1430; gives closing announcements at 1500 followed by sign-off of bugle sounding "Lights Out." (Pearce, England) Jerusalem, 6.830, noted with French program at 1615-1700; announced "Ici Jerusalem." (Sutton, Ohio) Tel Aviv, 9.0108, noted opening in native at 1200 with strong signal. (Fargo, Ga.)

Italy—Rome noted on 11.91 in *English* for South Africa 1345-1430. (Pearce, England) Heard on 9.575 with news 2145-2200. (Patterson, Ga.) I have heard Rome sign on at 1900 on the 9.575 channel.

Rome noted parallel on 3.97 and 6.255 at 1740 with Italian programs; still going at 1810; heard recently on 6.01 and 9.575 with *English* in progress when tuned at 1425; is directed to Great Britain at that time.

Transmitter building of TGNA, missionary voice in Guatemala City. This view is of the back of the building and shows the station's tallest antenna tower, 163 feet, with a 25-meter quad on top. This tower also supports the m.w. vertical wire.

Jamaica—Radio Jamaica still noted closing down daily 2300 on 3.360 and announcing sign-on for 0630. (Fox, D.C.) If not found on 3.360, try the "old" 4.950 channel. McWalter, Scotland, has heard this one on 3.360 from around 1830 onwards, fades out occasionally.

Japan—JKI, 4.910, noted 0500-0800 fade-out, fair level; JBD3, 15.225, heard 0130-0400 sign-off weak. (Saylor, Va.) JKH, 7.257, noted with recordings 0345 and still readable in Britain at 0500. (Pearce)

Kashmir—Radio Srinagar, 4.865, is heard to 1130.

Kenya—According to a DX session from OTC2, 9.767, Leopoldville, Bel-

ACID-FLUX SOLDER

By HERBERT S. BRIER

ELECTRONIC technicians, who are sometimes tempted to circumvent Ohm's Law, would rather eat oysters in July than to violate the command "*Thou shalt not use acid-flux solder.*" As with most laws, however, there are times when it can be safely ignored. Consider the following:

You are servicing a receiver with, say, a defective filter condenser. Electrically, the repair is simple, but mechanically it is a headache. The old condenser, apparently the first part mounted, is riveted to chassis and completely surrounded by other parts. There is no room to drill out or file the rivet without removing the obstructing parts; therefore you bend the mounting strap back and forth until it breaks. Although the old condenser is now out, the rivet is still there. After searching unsuccessfully for another spot to put the replacement, you decide to solder the new mounting strap to the chassis. Usually, the chassis is dirty and, with no room to work, it refuses to tin. Of course, with patience, the job can be done at the cost of a few charred parts and burned knuckles.

This is what happens with rosin-flux solder. But what a difference a little acid-flux solder makes. The chassis tins easily and, after wiping with a bit of cloth to remove any excess flux, you solder the mounting strap to it with regular rosin-flux solder.

Occasionally, a receiver comes in with a pulley, swedged to a control shaft, loosened. Repair without damaging the control or other components generally requires removing the assembly from the chassis. Probably every technician facing the problem has tried soldering at least once. He usually discovers that either the shaft or the pulley is impervious to rosin-flux solder. Acid flux makes child's play of the job. Tin both parts with it and finish with rosin-core solder.

Rubber-covered "a.c. cord" sometimes solders with the greatest difficulty only after meticulous scraping of each individual strand of wire. Tinning first with acid-flux makes the task easier and usually results in a better job. Use it exceedingly sparingly—just enough to tin the wire, wipe off immediately, and finish with rosin-flux solder, applying heat long enough to cook out any residual acid. The last step is especially important because, of the three samples given, it is the only one where a little corrosion would do any important damage.

Other spots where acid-flux solder could be used to advantage have undoubtedly come to your mind. The important thing to remember is that it is a special-purpose tool. Used as above, it is invaluable, while, if used to solder something like an i.f. or r.f. coil, it is almost certain to result in an open coil or a very noisy receiver.

In my work, a single dime spool of acid-flux solder outlasts pounds of rosin-flux solder, but it is always ready when needed.

—30—

1000 KC crystal BT cut	$3.95
3" scope shield	1.29
2 speed dial drive for ¼" shaft ratios 5:1 1 to 1	.39
ATC 100 mmfd air trimmer screwdriver shaft	.29
Centralab 850 S 50MMF 5KV BUTTON COND.	.39
500 watt 12.5 ohm power rheostat	3.49

R·H·S
SPECIALS OF THE MONTH

6v, 12v vibrators any type	$ .98
Rotary switch Mycalex, 2 deck SP3T	.39
1 mfd 5000v oil condenser	2.98
2 mfd 3000v oil condenser	3.25
3 mfd 4000v oil condenser	3.95
24 mfd 1500v DC 3KV flash. Excellent for speed lamp	3.95

TUBES!! BRAND NEW! STANDARD BRANDS! NO SECONDS! COMPARE! TUBES!!

0A3/VR75	$1.69	3C23	$ 9.95	204A	$69.50	809	$ 2.45	8012	$ 3.95	0A2		5Z4		6SN7GT		12SJ7	
0B3/VR90	1.29	3C24/24G	2.25	211	.99	810	9.95	8013	2.95	0A4G		6A3		6SQ7		12SK7	
0C3/VR105	1.49	3C30	2.95	211E	49.50	811	2.95	8014	29.95	0B2		6A4LA		6SR7GT		12SL7	
0D3/VR150	1.29	3C31/CTB	3.49	215A	.19	812	2.95	8020	1.29	0Z4		6A6		6SS7		12SN7	
1B22	3.45	3C45	12.75	217C	8.95	812H	6.90	8025	5.90	01A		6A7		6ST7		12SQ7	
1B23	12.50	3CP1	2.25	227A/5C27	8.95	813	8.95	9001	2.25	1A3		6A8		6SU7GTY		12SR7	
1B24	6.95	3CP1-81	3.95	240C	3.95	814	3.95	9002	1.49	1A4P		6AB7		6SV7		1223	
1B26	3.95	3DP1	4.95	250R	12.95	815	2.95	9003	1.49	1A5GT		6AC5GT		6T7G		14A4	
1B27	24.50	3DP1A	6.95	250TH	21.50	816	1.19	9004	.45	1A6		6AC7G		6T8		14A7	
1B29	7.95	3DP1-82A	6.95	250TL	11.50	826	.98	9005	2.35	1A7GT		6AD7G		6U5G		14B6	
1B32	8.95	3D21A	1.98	274A	5.50	828	12.75	9006	.29	1AB3		6AE6G		6U6GT		14E7	
1B36	24.96	3E29	14.95	274B	2.69	829	12.95	C1A	9.95	1B3/8016		6AF6G		6U7G		14F8	
1B38	32.50	3EP7	5.95	276A	9.95	829B	14.95	C5B	9.95	1B4		6AG5		6V6		14H7	
1N21 Xtal	1.25	3FP7	3.95	293A	2.98	830B	3.95	C6A	7.95	1B5/25S		6AG7		6V6GT		14J7	
1N21A Xtal	2.25	3GP1	4.75	294A	5.75	832	9.95	C6J	9.95	1B7GT		6AH6		6W4		14N7	
1N21B Xtal	3.25	3HP7	3.95	300B	9.95	832A	9.95	C10DD	1.49	1C5GT		6AJ5		6W7G		14Q7	
1N22 Xtal	1.95	4-65A	14.21	304TH	27.50	833A	37.50	CK502AX	2.95	1C6		6AK5		6X4		14R7	
1N23 Xtal	2.25	4-125A	26.95	304TL	29.95	836A	3.95	CK505AX	2.25	1C7G		6AL5		6X5GT		20	
1N23A Xtal	3.25	4-250A	29.95	305A	1.69	837	2.95	CK506AX	2.25	1D5GP		6AL7GT		6Y6G		24A	
1N23B Xtal	4.95	4AP10	4.95	307A/RK75	5.95	838	2.95	CK507AX	2.25	1D7G		6AQ5		6Y7G		25L6GT	
1N27	1.69	4B22/EL5B	9.95	310A	8.95	841	.45	CK512AX	2.25	1D8GT		6AS6		6Z7G		25Z5	
1N34	1.40	4B24/EL3C	7.95	313A	.65	843	3.95	CK517AX	8.45	1E5GT		6AR5		6ZY5G		25Z6GT	
1N34A	1.40	4B25/6CP	8.95	323A/B	24.50	845	4.95	CK1005	1.89	1E7G		6AT6		7A4/XXL		26	
1P23	3.95	4B26/2000	8.95	327A/5C27	4.95	849	29.50	CK1006	.95	1F4		6AU6		7A5		27	
1P24	1.79	4B28	4.95	328A	13.95	851	69.50	E1148	.35	1F5G		6AV6		7A6		28D7	
1P36	1.95	4B32	9.95	331A	12.95	852	69.50	EF50	.89	1G4GT		6B4G		7A7		30	
1P37	6.95	4C27		350A	8.95	860	6.95	F123A	8.75	1G6GT		6B6G		7A8		31	
2AP1	8.95	CV92	49.50	350B	9.95	861	29.50	F127A	22.50	1H4G		6B7		7AG7		32	
2AP5	6.95	4C35	29.50	388A/S	7.95	862	29.50	F128A	89.50	1H5GT		6B8G		7B4		32L7GT	
2C21/RK33	.69	4D22	12.95	371A	1.49	865	1.45	F400	37.60	1H6GT		6BA6		7B5		33	
2C22/7193	.49	4D32	14.95	371B	.98	866A	1.39	F660	79.50	1L4		6BE6		7B6		34	
2C26A	.49	4E27/		388A	2.75	866JR	1.29	FG17	3.95	1LA4		6BF6		7B7		35/51	
2C34/RK34	4.95	257B	17.95	393A	6.95	869B	39.50	FG27A	8.75	1LA6		6BG6G		7C4		35A5	
2C39	24.50	5AP1	3.69	394A	4.95	872A	2.49	FG32	7.95	1LB4		6BH6		7C5		35B5	
2C40	4.95	5AT4	3.69	417A	1.49	874	1.49	FG57	14.95	1LC5		6BJ6		7C6		35C5	
2C43	14.95	5BP1	5.95	434A	4.95	876	.59	FG81A	3.95	1LC6		6BQ6GT		7C7		35L6GT	
2C44	1.49	5BP4	5.95	446A	4.95	878	2.25	FG105	8.95	1LD5		6BR6		7D5		35W4	
2C46	7.90	5CP1	4.95	446B	4.95	884	1.49	FG172	29.50	1LE3		6C4		7E6		35Y4	
2C51	9.75	5CP7	4.95	450TH	47.50	885	1.49	FG186	89.95	1LG5		6C6		7E7		35Z3	
2D21	1.79	5C22	49.55	450TL	44.50	902	8.95	FG434A	4.95	1LH4		6C8G		7E8		35Z4	
2E22	1.95	5D21	24.50	527	12.75	905	3.89	FG451	1.89	1LN5		6D6		7F7		35Z5	
2E24	4.89	5FP7	4.95	559	1.39	908	7.95	FG502A	1.89	1N5GT		6D8G		7H7		36	
2E26	3.69	5GP1	4.95	562	97.50	918	1.69	GL562	97.50	1P5GT		6E5		7K7		37	
2E30	2.29	5JP1	24.45	575A	13.95	919	2.79	GL592	14.95	1Q5GT		6F6		7N7		38	
2J21A	9.95	5JP2	24.45	703A	5.95	922	.79	HF125	14.95	1R4		6F6G		7Q7		39/44	
2J22	8.45	5J23	12.95	702A	3.95	923	1.05	HF300	19.95	1R5		6F8G		7S7		41	
2J26	29.50	5J29	12.95	703A	7.95	927	1.59	HY114B	.79	1S4		6G6G		7V7		42	
2J27	29.50	5J30	49.50	703A	1.95	930	1.98	HY115	.79	1S5		6H6		7W7		43	
2J30	39.50	5J32	99.50	705A	.89	931A	4.95	HY615	.29	1T4		6J5GGT		7X7		45Z3	
2J31	39.50	5LP1	13.95	706HY	39.50	954	.39	KK4	37.50	1T5GT		6J5		7Y4		45Z5	
2J32	39.50	5NP1	5.95	706GY	39.50	955	.45	KU610	6.95	1U4		6J5GT		7Z4		46	
2J33	39.50	6AS6	3.69	706FY	42.50	956	.45	ML101	69.50	1V		6J6		12A		47	
2J34	39.50	6C21	22.50	706GY	42.50	957	.45	REL21	3.25	1V		6J7		12A		48	
2J36	97.50	6F5	5.95	707B	17.95	958	.45	RK20	6.95	2A3		6J7GT		12A6		49	
2J37	12.75	6J4	5.95	708A	4.95	959	.65	RK25	4.49	2A5		6K5GT		12A7		50A5	
2J38	12.75	7HP7	8.95	709A	3.95	991/NE16	.39	RK33	.69	2A6		6K6GT		12A8GT		50B5	
2J39	39.50	9GP7	14.95	710A/8011	11.75	993	3.25	RK34	4.49	2A7		6K7		12AH7GT		50C5	
2J40	39.50	9JP1	14.95	713A	1.45	1613	1.25	RK48A	4.49	2B7		6K8		12AL5		50L6GT	
2J46	39.50	9LP1	19.95	714AY	6.95	1614	1.95	RK59	1.49	2V3G		6L5G		12AT6		50Y6	
2J48	29.50	9LP7	14.95	715A	9.95	1619	.98	RK60/1641	6.95	2X2		6L6		12AT7		53	
2J49	29.50	10HP4	16.95	715B	12.95	1619	.29	RK65	24.50	2X2A		6L6G		12AU6		56	
2J50	22.50	7DP4	17.95	715C	24.50	1622	1.98	RK72	.59	3A4		6L6GA		12AU7		57	
2J54B	39.50	10	.49	717A	1.69	1624	1.98	RK73	.59	3A5		6L7		12AV6		58	
2J55	97.50	12DP7	16.95	721A	3.95	1625	.49	RK81A	2.95	3A8		6L7G		12AV7		59	
2J56	97.50	12GP7	16.95	722A	2.95	1626	.35	RX120	8.95	3B7/1291		6N7		12BA6		70L7	
2J62	49.50	12HP7	16.95	723A	9.95	1629	.25	VT09	6.95	3B7/1290		6SG7		12BE6		71A	
2K25/		12JP4	22.50	723AB	19.95	1630	.49	VR78	.95	3LF4		6SH7		12C8		72	
723AB	24.95	15E	1.19	724B	3.89	1631	1.29	VR91	1.49	3Q4		6SK7		12F3GT		76	
2K28	39.50	15R	.89	725A	7.95	1632	.79	VR92	.98	3Q5GT		6SL7		12H6		77	
2K29	24.50	16CP4	42.50	726A	6.95	1633	.75	VT127A	3.95	3S4		6SN7GT		12J5GT		78	
3AP1	9.95	16CP4	42.50	726B	29.50	1634	.75	VT158	14.95	3V4		6SQ7		12J7GT		80	
3B22/		19T8	1.29	726C	49.50	1636	3.25	VU29	2.95	5R4GY		6SR7		12K7GT		82	
ELIC	2.95	22HP4	.45	730A	12.95	1638	.65	VU111	.65	5T4		6SS7		12K8		83	
3B23/		28D7	.98	750TL	79.50	1644	.98	WL468	12.95	5U4G		6SD7GT		12Q7		83V	
RK22	4.85	30 Special	.59	800	1.95	1654	2.39	WL530	12.75	5V4G		6SF5		12SA7GT		84/6Z4	
3B24	5.95	35TG	4.95	801A	4.95	1655	1.89	WL531	12.75	5W4		6SF7GT		12SC7		85	
3B24W	7.50	35 Special	.39	802	4.49	1851	1.89	WL532	12.95	5X4G		6SG7		12SF5		89Y	
3B25	4.65	53A	5.95	803	4.49	1960	.79	WL578	1.29	5Y3GT		6SH7		12SF7		117L7/M7	
3B26	3.95	75TL	6.95	804	9.95	2050	1.25	WL616	37.50	5Y4G		6SJ7		12SG7		117N7	
3B27	3.95	100R	.89	805	4.49	2051	.65	WL619	18.95	5Y3GT		6SK7		12SH7		117P7	
3B28	3.95	100TH	9.95	806	29.95	8005	5.95	WL677	34.50	5Y4G		6SL7GT		12SH7		117Z3	
3BP1	8.95	121A	2.98	807	1.98	8011	1.75	WL681	22.50	5Z3						117Z6	
3C22	64.50	203A	8.95	808	4.49												

DUE TO CURRENT NATIONAL EMERGENCY AND THE CRITICAL RECEIVING TUBE SHORTAGE, TUBES WILL BE SHIPPED AT PREVAILING PRICES. WE WILL QUOTE ON LARGE OR SMALL QUANTITIES.

FULL-WAVE SELENIUM RECTIFIER STACKS
Voltage and Current Ratings Based on 35° C. Ambient, Self-Cooled

Max. A.C. Input Volts RMS	Max. D.C. Volts Output	Cell Size in Inches	Max. D.C. Amps. Output Continuous	Order by This Number	Price
SINGLE PHASE BRIDGE					
0-18	0-14.5	1¾" x1¾"	1.3	18H4D1S1	$ 2.95
"	"	2-3/16"x2-3/16"	2.4	18H4E1S1	3.95
"	"	3⅜" x3⅜"	6.6	18H4F1S1	5.45
"	"	4⅛" x5"	13.0	18H4K1S1	9.50
"	"	5" x6"	17.5	18H4L1S1	12.40
"	"	4⅛" x5"	26.0	18H4K1S2	18.65
"	"	4⅛" x5"	39.0	18H4K1S3	25.95
"	"	4⅛" x5"	52.0	18H4K1S4	31.75
"	"	4⅛" x5"	70.0	18H4J1S4	37.50
0-40	0-34	1¾" x1¾"	0.60	40H4D1S1	3.45
"	"	2-3/16"x2-3/16"	1.2	40H4EW1S1	4.45
"	"	3⅜" x3⅜"	3.2	40H4FW1S1	5.75
"	"	4⅛" x5"	6.0	40H4K1S1	10.50
"	"	5" x6"	9.0	40H4JW1S1	13.90
"	"	4⅛" x5"	12.0	40H4K1S2	19.89
"	"	5" x6"	18.0	40H4JW1S2	23.75
"	"	4⅛" x5"	25.0	40H4J1S3	33.25
"	"	4⅛" x5"	34.0	40H4J1S4	36.45
"	"	5" x6"	36.0	40H4JW1S4	41.95
0-120	0-100	1¾" x1¾"	0.60	40H4D3S1	8.45
"	"	2-3/16"x2-3/16"	1.2	40H4EW3S1	11.55
"	"	3⅜" x3⅜"	3.2	40H4FW3S1	17.95
"	"	4⅛" x5"	6.0	40H4K3S1	25.95
"	"	5" x6"	9.0	40H4JW3S1	34.25
CENTER-TAP					
10-0-10	0-8	1¾" x1¾"	1.2	20C2D1S1	$ 2.25
"	"	2-3/16"x2-3/16"	2.4	20C2EW1S1	2.95
"	"	3⅜" x3⅜"	6.4	20C2FW1S1	4.55
"	"	4⅛" x5"	12.0	20C2K1S1	8.89
"	"	4⅛" x5"	16.0	20C2J1S1	8.45
"	"	4⅛" x5"	24.0	20C2K1S2	11.69
"	"	4⅛" x5"	36.0	20C2K1S3	15.25
"	"	4⅛" x5"	48.0	20C2J1S3	18.10
"	"	4⅛" x5"	64.0	20C2J1S4	21.49
"	"	4⅛" x5"	80.0	20C2J1S5	26.50
"	"	5" x6"	84.0	20C2KW1S7	29.95
"	"	5" x6"	96.0	20C2J1S6	34.95
"	"	4⅛" x5"	128.0	20C2J1S8	45.50
3 PHASE BRIDGE					
0-120	0-150	1¾" x1¾"	0.90	40B6D3S1	$14.95
"	"	2-3/16"x2-3/16"	1.8	40B6EW3S1	16.65
"	"	3⅜" x3⅜"	4.75	40B6FW3S1	23.10
"	"	4⅛" x5"	9.0	40B6K3S1	42.50
"	"	5" x6"	12.5	40B6J3S1	46.89
0-240	0-300	1¾" x1¾"	0.90	40B6D6S1	$27.95
"	"	2-3/16"x2-3/16"	1.8	40B6EW6S1	31.50
"	"	3⅜" x3⅜"	4.75	40B6FW6S1	47.75
"	"	4⅛" x5"	9.0	40B6K6S1	85.95
"	"	5" x6"	12.5	40B6J6S1	97.25

Note: All Current Ratings Can Be Increased 2 to 2½ Times Normal Ratings by Fan Cooling.
When Moisture and Fungus Proof Is Desired Add Letter "N" to Last Number of Code

TRANSFORMERS—115V 60 CY
HI-VOLTAGE INSULATION

2700v @ 2 MA; 6.3v @ .6A; 2.5v @ 1.75A.. $ 4.45
2500v @ 15 MA.. 1.49
1540v @ 5 MA; 340-0-340 @ 300 MA.. 4.35
925v @ 10 MA; 525-0-525v @ 60 MA; 2X5v @ 3A; 6.3v @ 3.6A; 6.3v @ 2A; 6.3v @ 1A.. 4.85
500-0-500v @ 175 MA.. 4.55
425-0-425v @ 75 MA; 6.3v @ 1.5A; 5v @ 3A.. 3.65
415-0-415v @ 60 MA; 5v CT @ 2A; 115/230 Dual Pri.. 4.25
400-315-0-100-315v @ 200 MA; 2x6.3v @ 9A; 5v @ 3A; 2.5v @ 2A.. 5.35
500-385-0-385v @ 200 MA; 3x6.3v @ 6A; 5v @ 3A; 2.5v @ 2A.. 4.75
375-0-375 @ 175 MA, 5v @ 3A, 6.3v @ 5A, 78 v @ 1A.. 3.79
350-0-350v @ 35 MA.. 2.49
325-0-325v @ 12 MA; 255-0-255v @ 240 MA.. 4.25
300-0-300v @ 65 MA; 6.3v @ 2.5A; 6.3v @ 1A; 2.5v @ 2A.. 3.25
80-0-80v @ 225 MA; 5v @ 2A; 5v @ 4A.. 2.97
0-17.4/21.6/25.8v @ 400 MA; 6.4v @ .5A; 2.6v CT @ 2.5A Pri 115/230.. 3.85
12.6v CT @ 10A; 11v CT @ 6.5A.. 6.35
3x10.3v CT @ 7A.. $6.95 6.3v @ 1A.. .98
6.5v @ 12A; 6.3v @ 2A; 115v @ .1A.. 3.50
6.5v @ 8A; 6.5v @ 6A; 2.5v @ 1.75A.. 4.17
6.3v @ 1A; 2.5v @ 2A.. $2.29 4.0-0-4v @ 1A.. .87
6.3v CT @ 3.5A; 2x2.5v CT @ 3A.. 2.97
5v CT @ 20A; 10 KV INS.. 8.95
.6v @ 15A RMS.. 1.47

TRANSFORMERS—220v 60 Cyc

512.5-0-512.5 @ 427 MA.. $ 5.35
3x5v @ 6A; 4v @ .25A.. 2.95
3x6.3v CT @ 3A; 6.3v CT @ 1.6A.. 2.95
10v CT @ 6.5A; 6.3v CT @ 2.3A; 6.3v CT @ 1.8A 220/440 Pri.. 3.95
Step Up/Down 110/220, 500 watt.. 10.95

EQUIPMENT SPECIALS

ATR Inverter 12v DC in 110v AC Out 125 w Int. 100 w Cont.	New	$14.95
AN/CRW-2 UHF Receiver Less Tubes	New	5.95
BC433 Receiver	Good	24.94
BC456 Modulator	Good	1.98
BC434A Control Box/BC433	Used	1.95
BC459 Transmitter	Good	10.95
BC778 Gibson Girl	Good	3.95
BC950A-121 Xmitter 100-156 MC	New	69.50
BC1016 Tape Recorder	New	499.50
BC1206B Beacon Receiver, Less Tubes	Good	3.95
CF1 Navy Unit w/200KC Crystal	New	14.95
DM 19 Dynamotor 12v DC in 500v 200 MA Cont. Output	Good	6.95
MN26C Compass Receiver	Good	24.95
M110 Dynamic Chest Mike	New	3.95
PE94 Dynamotor/SCR522	Good	1.98
PE97A Vibrator Power Supply	New	6.95
PE103 Dynamotor	Like New	29.95
R89/ARN5 Receiver Less Tubes, Covers	Good	14.95
SCR518 Altimeter Complete	New	97.50
T17 Carbon Mike	Used	1.59

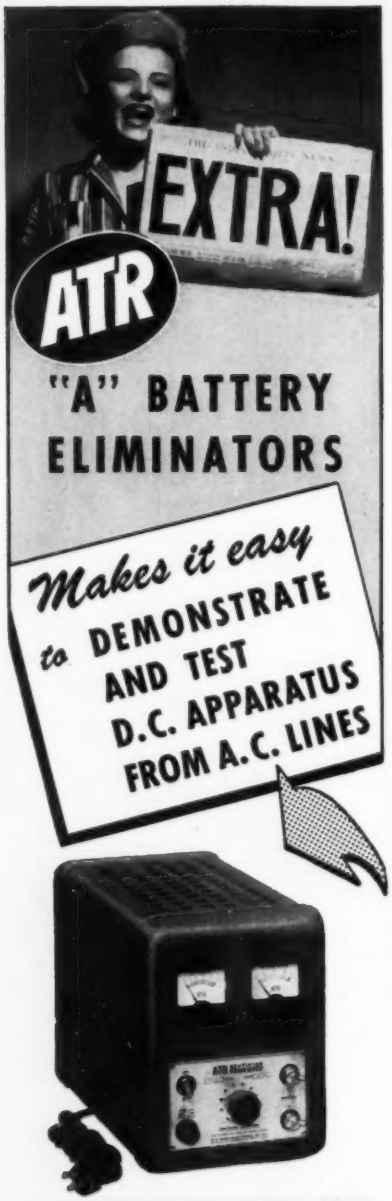
FILTER CHOKES HI V INS

.025 HY @ 1.56A..$1.98
2 HY @ 175 MA.. 1.49
5 HY @ 50 MA.. .98
5 HY @ 1A.. $3.95
5 HY @ 70 MA/2 HY 350 MA Dual 2.39
10 HY @ 700 MA..13.95
10 HY @ 55 MA.. .89
10 HY @ 100 MA. 1.49
10 HY @ 250 MA..$3.15
10/20 HY @ 85 MA 1.49
13 HY @ 130 MA. 1.95
15 HY @ 25 MA.. .59
200 HY @ 10 MA. 2.95
325 HY @ 2 MA.. 2.95
600 HY @ 1 MA.. 2.95

RADIO HAM SHACK Inc.
189 GREENWICH STREET . NEW YORK, N. Y.
PHONE DIGBY 9-0347

WRITE FOR QUANTITY PRICES

Prices subject to change without notice. F.O.B. NYC, minimum order $10.00. 20% deposit required. All merchandise guaranteed.



for DEMONSTRATING AND TESTING AUTO RADIOS

New Models . . . Designed for testing D. C. Electrical Apparatus on Regular A. C. Lines. Equipped with Full-Wave Dry Disc Type Rectifier, Assuring Noise-less, Interference-Free Operation and Extreme Long Life and Reliability.

✓NEW MODELS ✓NEW DESIGNS ✓NEW LITERATURE

"A" Battery Eliminator, DC-AC Inverters
Auto Radio Vibrators

ATR

See your jobber or write factory

AMERICAN TELEVISION & RADIO CO.
Quality Products Since 1931
SAINT PAUL 1, MINNESOTA-U.S.A.

gian Congo, the Forces Broadcasting Service at McKinnon Road, is scheduled weekdays 2200-0000, 0400-1130, 0900-1400; Sundays 0000-0200. (Bellington, N.Y.) This is a "good catch;" seldom heard in USA, but has been logged a few times 2300-2400 by Stark, Texas; announcement seems to be simply "Forces Broadcasting Service," Stark says.

Nairobi, 4.855, noted with "Epilogue" and closing just before 1400. (Pearce, England)

Liberia—ELB2, 6.025, Monrovia, has been heard in New Jersey by Oskay and by myself in West Virginia, closing around 1845; announcements at close are by man in *English*, asking for reports "if you want these broadcasts to continue;" the Liberian National Anthem is played just before the station leaves the air; the announcer is John B. West, he says. QRA is Dr. John B. West, The Liberian Broadcasting Company, ELB2, Monrovia, Liberia (Africa). On a Sunday, Oskay noted the station 1745-1845 with a "Voice of America" program (an NBC drama) which probably was a recording.

Madagascar — Radio Tananarive broadcasts French programs on 6.172 and 9.515 on weekdays at 2230-0030, 0400-0600, 1000-1430; Sundays at (Sat. EST 2300)-0245, 0330-0600, 0915-1430. Malgache programs are radiated on 7.374 and 9.693 daily 2230-0000, 0320-0530, 0900-1200. (Radio Sweden)

Malaya—Red Network of *Radio Malaya*, 4.780, Singapore, logged 0945; woman announcer; closing announcements and sign-off with "God Save the King" is 1030. Same network noted on 4.825 at 1025 and signing off 1100 with "God Save the King." (Pearce, England) Singapore, 7.25, signs on 0530 most days but on Sat. and Sun. at 0430; closedown usually is at 1100; carries all-*English* programs; has news 0630 (carried parallel over Kuala Lumpur, 6.025). Also noted on a *new* channel of 6.135, signing on 0530; all-native; not in parallel with 7.20 when noted; the 7.20 channel signs on 0430 with all-native program.

Malta—Forces Broadcasting Service, Middle East, appears to be on the air from 2330 currently on (announced) 7.220, 6.015, 3.305; all are heard in USA. Pearce, England, reports the 7.220 channel signing off 1600; he recently noted this station on its "old" 4.965 channel at 1515 in parallel with 7.220 and 3.305. Noted on 11.895 with BBC relay 1115, fair signal in Calif., reports Balbi.

Mauritius—Forest Side, near 15.060, noted 1127 and to 1230 when closes with "God Save the King." (Pearce, England) *NATTUGGLAN*, Sweden, reports this one at 2200-2300.

Monaco—Radio Monte Carlo, 9.785, noted to after 1630; has CWQRM. (Stark, Texas)

Mozambique—Pearce, England, says CR7BU, listed 4.925, appears as low as 4.910 lately; noted 1240.

The 11.764 channel noted in *English* recently 0002-0035 with request musical numbers, frequent time checks, commercials. (Patterson, Ga.)

Saylor, Va., recently noted Lourenco Marques on 9.766 testing 0300 with powerful signal.

The Portuguese program noted from 2400 opening on 9.83 to 9.835, moved from 9.805. (Bellington, N. Y.)

New Zealand—ZL3, 11.782, noted 1557 relaying BBC. (Tanczos, Ohio) ZL4, 15.28, is heard well in Kentucky after 0000. (Roemer)

Now announces as "The New Zealand Broadcasting Service" *not* "Radio New Zealand." (Kinge, N.Y.)

Nicaragua—Radio Colonial, 5.983, Leon, noted to after 2145. (Stark, Texas)

Pakistan—Pearce, England, says that the only *English* broadcast he currently can hear from *Radio Pakistan* is at 0210-0220 on 17.770; an-

(*Continued on page* 125)

Robert R. Burton, head of communications for the Federal Civil Defense Administration in Washington, recently visited General Electric's Electronics Park in Syracuse. He met with members of the company's new Civil Defense committee and discussed the possible applications of two-way mobile radio for civil defense. The committee is directing a broad program of assistance in the electronics field to civil defense organizations. Members of the committee, left to rght, are: Neal F. Harmon, Lacy W. Goostree, Mr. Burton, Paul L. Chamberlain, Ellis M. Trefethen, and Roy D. Jordan.

RADIOMEN'S HEADQUARTERS ✻✻ WORLD WIDE MAIL ORDER SERVICE!!!

BUFFALO RADIO SUPPLY

219-221 Genesee St.,
Dept. RN-4
Buffalo 3, New York

BEST BUY OF THE MONTH

Portable Public Address Amplifier

Brand new Portable Public Address System complete with everything, including Speaker, Mike and Tubes. Comes in expensive-looking portable case with genuine leather handle and airplane luggage covering. Only $29.95 complete. Order a half dozen, then rent each out for as little as $3.00 a day, and enjoy an income from that source alone of $6500.00 a year. BUT, make certain that you get a substantial deposit on each rental, because these amplifiers are so classy looking that many customers will be tempted to lose their deposit and keep your Public Address System.

MAGNAVOX HIGH FIDELITY AMPLIFIERS

HIGH FIDELITY FANS • PUBLIC ADDRESS MEN

30 Watts output, 10" x 14" Chassis. Weighs 20 lbs. Includes broadcast quality, input pushpull transformer in heavy steel case. Double pushpull. 6 Tubes included.

Put this amplifier in that Hi-Fi tuner or phono job that has never quite come up to expectations, and thrill to the same performance that you would get from a $500.00 combination by one of America's most quality-conscious manufacturers. You probably recognize that practically every television set has audio reproduction inferior not only to a console model radio but even to the cheapest table model radio. This seems true regardless of the price of the set. TV sets of all makes are apparently made for the tin-eared listener. What a difference when you can enjoy TV with an amplifier like this made by a quality conscious organization for the golden-eared highly critical lover of the best in music. First come, first served with this terrific bargain. Only 300 Magnavox 30 watt amplifiers complete with tubes are available. When our stock is gone there are no more to be had even at ten times our fantastically low price of $25.00 apiece. Rush order now—don't delay and have vain regrets later.

MAGNAVOX DIVIDING NETWORKS

for low and high Frequency Speakers

Calculated crossover frequency for 50% of power to each speaker 400 cycles. Calculated crossover for distribution of ⅔ of the audio output to woofer and ⅓ total output to tweeter is 800 cycles. Includes inductance and capacity sections. Input impedance usable with any speakers. Will handle up to 120 watts of audio power. Similar equipment is catalogued by other manufacturers up to $35.00. Your special bargain at $3.00 complete, with nothing else to buy.

COAXIAL SPEAKERS

Latest Model Co-Axial Speaker—Woofer-Tweeter design. Response 40 to 17,500 cps. New efficient speakers represent the result of years of research. Low and high pass filter built-in. Only 2 wires to connect. 8 ohms impedance. **$12.50** each or **$24.00** for 2. Only

WE ARE LOOKING FOR TUBES

and other surplus. Large or small quantities. Send your list for our bid.

Antenna For SOS Transmitter

Antenna Kit for emergency transmitter. This kit was designed to improve the effectiveness of the Transmitter by increasing the range several times. The kit includes 300 feet of special antenna wire, two balloons for raising the antenna in calm weather, two hydrogen generators to inflate the balloons, a special box kite for antenna erection in windy weather, and a search-light, powered by the crank operated generator in the transmitter. Complete kit **$9.95.**

SOS EMERGENCY TRANSMITTER

This is used as a distress call transmitter on boats and airplanes. It is the easiest transmitter in the world to operate. No instruction or experience necessary. No external power supply required for operation. It is merely necessary to turn the crank on the top of the transmitter and power is generated and the distress signal is automatically sent out on the international distress frequency. Brand New Transmitter complete with tubes, **$9.95.**

BOMBSIGHT POWER UNIT

SUPER SPECIAL. Each unit is brand new, contains 8 electric motors or generators, 6 of which are of the permanent magnet type; relays; and numerous valuable precision resistors plus a multitude of the ordinary kind, in addition to many condensers and potentiometers. All for only **$9.95.**

Super Special Condenser Bargains

40, 20, 20 MFD—150 W.V. condensers with common negative—**55c** or **10** for **$5.00.**
20, 20 MFD—150 W.V. plus in condensers. **40c** or **10** for **$3.50.**
8 MFD 475 W.V. Tubulars 35c or 10 for $2.90.
16 MFD 475 W.V. Tubulars 55c or 10 for $3.90.
8-8 MFD 475 W.V. Tubulars 60c or 10 for $4.20.
8 MFD 475 W.V. Screw neck cans 65c or 10 for $5.50.
16 MFD 350 W.V. Screw neck cans 65c or 10 for $5.50.
10 MFD 450 W.V. Twist Lug 35c or 10 for $2.90.
10+10 MFD 450 W.V. Twist Lug 60c or 10 for $4.20.
10+15 MFD 450 W.V. Twist Lug 70c or 10 for $6.00.
20+20 MFD 450 W.V. Twist Lug 80c or 10 for $7.00.

35MM SLIDE PROJECTOR & ENLARGER

Most terrific photographic bargain opportunity of the 20th century.

A fine precision instrument with many features.

- Takes roll film or 2x2 slides
- Automatic Slide changer furnished
- No more waiting for enlargements to enjoy your candid shots. All you need is a flat surface to project on
- Has 300 W 110V Bulb, but 6V, 12V, 32V or 220V Available
- Heat absorbing filter
- 8 precision-ground optical glass elements in optical system. (No other projector on the market has more)
- Automatic rewind on film
- Use as an enlarger for making your own prints of any desired size
- Plano-Convex Meniscus Condenser
- 5" focus Brown-Violet coated, double anastigmat lens
- Swivel projector head

Brand new Society for Visual Education Model AAA Projector. Regularly $80.00, Super Special **$40.00.** Quantity Limited.

"THE BIGGEST SHOW ON EARTH"

9-foot by 7-foot picture

Compact—Self Contained—Portable For Theaters—Auditoriums—Churches—Institutions—Hospitals

Imagine Clear, Bright, Steady TV with figures on the screen—

AS LARGE AS LIFE!!!

Picture can be regulated in size from 6 to 63 square feet. Vision Master projection model TV complete with all accessories, including movie screen, and is fully guaranteed.

Regular price $2195.00
Special Net—$795.00

RADIO KITS

Note: All diagrams; explanations in easy to understand language; and pictorial drawings are furnished with the following kits, so that they can be wired by almost anyone who can read. Useful information for this electronic age, that will remain with the builder a lifetime, will be derived from the technical material supplied and the opportunity to apply the information in construction of the kits, without even mentioning the satisfaction from years of use of the kit after it is properly wired, or possible profit from its sale. Radio kits sold less cabinets for **$1.50** under quoted price.

4-TUBE AC-DC RADIO KIT BR-24

4 tube AC-DC superhet kit No. BR-24, with high gain iron core I.F. transformer. All parts and a cabinet, but not tubes, are furnished for **$9.00.** Tubes can be obtained locally or we will furnish for **$5.00** per set when the kit is ordered.

5-TUBE SUPERHET KIT BR-26

5 tube superhet kit No. BR-25 with airplane dial.

- High gain Iron Core I.F. transformers
- Efficient loop antenna
- High ratio dial drive for hairline tuning
- Good tone
- Plenty of volume
- Razor sharp selectivity
- Super sensitivity

$10.00 complete except for tubes which can be purchased at your local radio store after the kit is wired, or purchased from us at the time the kit is ordered for **$6.50.**

5-TUBE SUPERHET KIT BR-25

5 tube superhet kit BR-26. Same specs. as BR-25, but larger chassis, larger speaker, larger cabinet, and straight line dial. Your cost complete for kit **$12.00.** Tubes **$6.50** per set.

SENSATIONAL 3-TUBE TV BOOSTER KIT

Latest circuit utilizing greatly improved push-pull circuit for maximum gain.

Perfect operation on higher channels where other boosters fail. Ceramic butterfly condensers. Coil sets for either low or high channels. 110V 60 cycle. Built up $29.95. Save half by buying the kit and wiring the parts together from the schematic and pictorial diagrams furnished. Kit $14.95

Our need for thousands of tubes for kits means that kit shipment can often be expedited by relying on a local radio store for tubes instead of ordering from us, as we delay kit shipment until tubes are available to go at the same time.

115 V., 60 Cycle TRANSFORMERS

Size of Set	Secondary	Price
4-5 Tubes	*650V.—40 Ma.—5V. & 2.5 or 6.3V.	$1.75
5-6 Tubes	*650V.—45 Ma.—5V. & 2.5 or 6.3V.	1.90
6-7 Tubes	*675V.—50Ma.—5V. & 2.5 or 6.3V.	2.35
7-8 Tubes	*700V.—70Ma.—5V. & 6.3 or Two 2.5V.	3.00
7-8 Tubes	700V.—70Ma.—5V. & 6.3 (25 cy.)	4.50
8-9 Tubes	700V.—90Ma.—5V.—3A. 2.5V.—3.5A 2.5-V.—10.5A.	3.50
9-11 Tubes	700V.—5V. & 6.3V. at 4A.	3.50
10-15 Tubes	600V.—150Ma.—5V. & 6.3V.	4.00
Fil. Xfmr.	12V.—40VA.	1.35
Fil. Xfmr.	5V.—4 Amp. 10,000 V. Insulation	1.95
Fil. Xfmr.	6.3—1.5 Amp.	1.15
Fil. Xfmr.	6.3—15A., 6.3—15A.	3.95
Isolation	115V. to 115V.—3A. Can be used as auto xfmr. to double or halve voltage	2.95
Isolation	6.3 to 6.3—5A. Can be used as auto xfmr. 10,000V. insulation	1.25

* Specify whether 6.3 or 2.5V. Filament is desired.

High Frequency Tweeter Speaker

For use with any cone speaker to produce a dual speaker combination with frequency range up to the limit of ability of the human ear. Cone speakers seldom reproduce effectively above 6500 cycles. Even low priced amplifiers far exceed this range and, in fact, always have at least some output up to the limit of audibility. These professional type famous name tweeters offer the opportunity to get extended range quality reproduction at lowest cost. Can be connected to the voice coil of any cone speaker through a simple high pass oil condenser filter costing **$1.00,** or better yet our crossover network, costing only **$3.00** can be used to supply both speakers. Suitable for home or theatre. Specs: 8 ohms, 10 oz. Alnico 5 magnet, 10⅛" by 5¾", 50° distribution angle, 600 to 15000 cycles. Your cost **$11.00. QUANTITY LIMITED!!!!!!**

KITS & ASSORTMENTS

Mica Condensers	100 for	$4.95
Ceramicon Condensers	15 for	.95
Wire wound resistors including adj. & tapped	12 for	1.00
Rotary Switches	8 for	1.75
Grid & Pl. Tube Caps	50 for	1.00
Coil forms asst.	50 for	1.00
Knobs Assorted	40 for	1.00
Fuses Asst.	100 for	1.95
Spaghetti Sleeving Asst.	75' for	1.00
Solder Lugs	300 for	1.00
Bakelite Terminal Boards	15 for	1.00
Micro Switches	3 for	1.00
TV Osc. & RF Coils	8 for	1.00
Rubber Grommets	40 for	1.00
Dial Scales	12 for	1.00

Multi-Range Model 458 AC-DC Volt-Ohm Milliammeter with Output Ranges

Specifications:

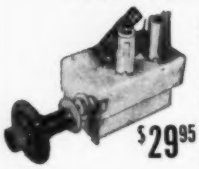
Volts DC: 0-5/10/50/100/500/2000-1000 Ohms per volt
Volts AC: 0-125/25/125/150/250/1250
Milliamperes DC: 0-1/10/100
Milliamperes AC: 0-2.5/25/250
Ohms Full Scale: 1000/200,000/2,000,000
Ohms Center Scale: 50/2250/22,500
Output: −5 to +55 Decibels

This versatile instrument has a large 5½" rectangular meter with two-tone aluminum scale, set at a 45° angle, to facilitate greater reading ease. Welded steel case, finished in brown wrinkle. All multipliers are bridge selected within one percent. Furnished with test leads. Shipping weight 8 lbs. Special **$26.00.**

ACORN

Gives You Old Low Prices Despite Increasing Costs and Tax Rates

DUMONT 4-CIRCUIT INPUTUNER
Series T-3A



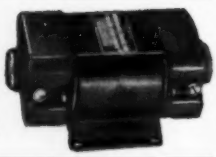
Featuring FM BAND reception, as well as 13 TV channels. Fits into dual channel IF system, Type 630 receivers, without alterations. Higher gain 2-to-1 ratio on high channels, low noise, input impedance 300 ohms. 21.25 mcs sound center IF. Continuous tuning. Complete with TUBES and KNOBS.

$29.95

PIONEER GEN-E-MOTOR

Type E-3:	Input 14 VDC @ 8 amps DC. Output 550 V at 120 mils.	$14.95
SP-125:	Input 28 VDC @ 2.2 amps DC. Output 270 V @ 120 mils. ...	$ 6.95
DS-125:	Input 28 VDC @ 1.2 amps DC. Output 260 V @ 60 mils.	$ 4.95

CARTER GENEMOTOR
Stock No. 4037AS



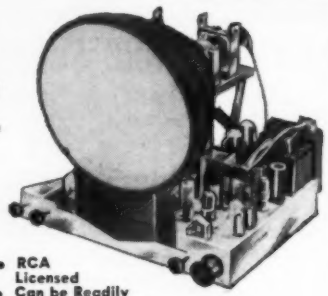
DC input 6VDC; output 400 V @ 375 mils DC. Perfect for mobile communications in car, plane or boat.

BRAND NEW —List $71.40. OUR PRICE. $34.95

T-17B CARBON MIKE

Single button carbon with press-to-talk switch, 5 ft. rubber cord and PL 68 plug. Used, but in perfect condition. All tested. $1.39

SIGMA RELAY—8000 ohm coil, SPST— each $2.95



- RCA Licensed
- Can be Readily Adapted for Color

30-TUBE 630 TV CHASSIS
TAKES ALL PICTURE TUBES FROM
16" to 20" ROUND OR RECTANGULAR

This remarkable chassis incorporates ALL THE SUPERIOR FEATURES and ENGINEERING ADVANCEMENTS that have been made to date! Designed to bring in sharp, clear pictures, even in fringe areas. This unexcelled unit features keyed AGC—complete noise immunity; FM traps; 15 KV under normal picture load; full four megacycle overall picture band width.
Factory aligned, ready-to-play, less CR tube

$169.50* Complete with 12" RCA SPEAKER

AVAILABLE WITH
DUMONT INPUTUNER
covering FM BANDS **$179.50** **PRICES INCLUDE ALL EXCISE TAXES

ALL SIZE PICTURE TUBES AVAILABLE

Phone WOrth 4-3270

ACORN ELECTRONICS CORP.
76 Vesey St. Dept. N-4 New York 7, N. Y.

TERMS: 20% cash with order, balance C.O.D. All prices F.O.B. our warehouse in N. Y. C. Minimum order $5. NOTE: Due to conditions beyond our control, prices are subject to change.

FOR *Greater* EARNINGS . . .
***Learn* RADIO-ELECTRONICS**

Train for Success in TELEVISION, RADIO, RADAR and ELECTRONICS. Learn the application of RADIO-ELECTRONICS to Aviation, Petroleum Exploration and other industries.

You learn on the finest equipment. You build equipment. You may join Spartan's "Ham" Club. Many large organizations call on Spartan regularly for graduates. Often, students are hired months before graduation.

Spartan offers two complete, thorough courses, preparing you for Federal Communication Commission license tests—first class radio telephone, second class radio telegraph or class "B" radio amateur.

SPARTAN
SCHOOL OF RADIO AND ELECTRONICS
TULSA, OKLAHOMA

Write Today!

MAIL COUPON TODAY
Spartan School of Radio and Electronics
Tulsa, Oklahoma, Dept RTN-41
Please send complete information.
Name _____ Age ____
Street _____ City _____ State _____
G. I. Approved—Write Today

AMPERITE

Studio Microphones at P.A. Prices

Ideal for BROADCASTING RECORDING PUBLIC ADDRESS

"The ultimate in microphone quality," says Evan Rushing, sound engineer of the Hotel New Yorker.

- *Shout right into the new Amperite Microphone—or stand 2 feet away—reproduction is always perfect.*
- *Not affected by any climatic conditions.*
- *Guaranteed to withstand severe "knocking around."*

Models
RBLG—200 ohms
RBHG—Hi-imp.
List $42.00

"Kontak" Mikes
Model SKH, list $12.00
Model KKH, list $18.00

Special Offer: Write for Special Introductory Offer, and 4-page illustrated folder

AMPERITE Company Inc.
561 BROADWAY • NEW YORK 12, N. Y.
Canada: Atlas Radio Corp., Ltd., 560 King St. W., Toronto

Novel TV Installation

(*Continued from page 57*)

tenna must be located for the best signal; that an efficient transmission line must be used and that impedances must be carefully matched on the long runs.

An installation requiring a long transmission line is shown on page 57 (right-hand photograph). The receiver, located in a home at the bottom of a canyon, is about seventy-five miles from the TV transmitters and the signal strength was too low to measure. No test pattern could be seen with any antenna. A long a.c. line was run to the hill and measurements were taken at many places near and on top of the hill. The location shown was one of three possibilities, but was better from a construction standpoint. The antenna and mast are standard commercial items and are easy to erect. Three flat iron stakes four feet long were used for guy wire anchors. Guy wire on hilltop jobs should be fairly heavy. The 450 ohm transmission line was run as described, and four hundred feet was required. The line was anchored to the roof and a short piece of twin-lead was used as a matching section. The signal received was adequate on all channels except Channel 2 which was to be expected. The customer is quite happy with his set.

The left-hand photograph (page 57) shows a similar job that is chiefly interesting because it shows the advantage of open-wire line. The set came into the shop for repair, and worked well when completed. The customer could see only two channels, 2 and 5, at home, so I went to look at the antenna. It was a stacked folded dipole with reflectors on both high and low band. The antenna location was good but power line interference was bad and the orientation not too good. The signal strength was very good at the antenna location, but very little of it was getting to the set. The transmission line was 300 ohm twin-lead held up on steel wire with steel loops around the twin-lead. A "Radar-ray" type antenna took care of the interference and 450 ohm open-wire line was used down the hill to the set. A short section of 300 ohm twin-lead was used from line to set. The results were well worth the effort as all channels are now received quite well. That transmission line is four-hundred-ninety feet long.

Many technicians have been unwilling to do jobs such as these because they believe the results will not justify the effort and expense. Such installations do cost extra to complete chiefly because the transmission line is expensive, but it takes too much time to make up the line and it is awkward to handle when not properly packaged. The customers have been quite willing to pay for the excellent results, however. —30—

22 YEARS and 28 Manuals TELL THIS STORY

Most servicemen inform us that they prefer RIDER MANUALS for their **absolute reliability.** Daily, they depend upon our Factory-Authorized, Factory-Accurate servicing information (from the service departments of the receiver manufacturers themselves) to speed repairs . . . remove all guesswork . . . and assure the satisfactory completion of repair jobs, whatever their nature.

Others favor the **completeness** of RIDER MANUALS . . . and the fact that, from this SINGLE SOURCE, they can get **everything** they need . . . original production runs, subsequent production runs—with all the changes.

And still others say it's the **ease** with which they are able to locate the exact data they want . . . and the **ease** with which they can make **full use** of this information.

Whatever their individual reasons may be, they all agree

Rider Manuals ARE BEST

The Latest in Television!

Rider TV Manual Vol. 6

Despite severe production difficulties, this new "BIG" TV Manual is ready for you. However, due to extreme paper shortages, we were unable to produce as many as we feel will be required. So make sure of your copy . . . order it from your jobber TODAY! This is another LARGE SIZE manual, with the equivalent of 2320 of our former 8½ x 11" page size, all filed in place. **$24.00**

The Latest in Radio!

Rider Manual Vol. XXI

FACTORY-AUTHORIZED servicing material from 61 manufacturers . . . AM—FM—Auto Radios—Record Changers—Disc and Tape Recorders. Coverage from Dec. 1949 through Oct. 1950. 1648 Pages PLUS Cumulative Index Volumes XVI through XXI. **$21.00**

Make sure that your Working Library of RIDER MANUALS is complete . . . with ALL of these indispensable volumes on hand.

Television Manual Volume 6 (Plus Index)	$24.00
Television Manual Volume 5 (Plus Index)	24.00
Television Manual Volume 4 (Plus "How It Works" Book and Index)	24.00
Television Manual Volume 3 (Plus "How It Works" Book and Index)	24.00
Television Manual Volume 2—In new, larger page size, 12" x 15". (Plus "How It Works" Book and Index)	24.00
Television Manual Volume 1 (Plus "How It Works" Book and Index)	19.80
Volume XXI	21.00
Volume XX	21.00
Volume XIX	22.50
Volume XVIII	22.50
Volume XVII	19.80
Volume XVI	9.90
Volume XV	22.50
Volume XIV to VII (each volume)	19.80
Volume VI	15.00
Abridged Manuals I to V (one volume)	19.80
Master Index, Covering Manuals Vol. I to XV	1.50
PA Equipment Manual, Volume I	18.00

JOHN F. RIDER PUBLISHER, INC.
480 Canal St. New York 13, N. Y.

Recording Equipment

(*Continued from page 35*)

The red knob at the right of console is the master echo return, which controls the over-all amount of echo returning to the console to be mixed with the main program material.

Another interesting feature of this studio, which cannot be seen in the picture, is the presence of large (8 x 10) movable acoustic panels, (hardboard surface on one side and glass wool on the reverse) which are hung from tracks in the ceiling. They hang parallel to the walls. If a live sound is needed, all the panels are turned with the hard side out, although for most purposes about half the panels are turned with the absorbent (glass wool) side facing the room.

The mixers and recording engineers all have extensive musical backgrounds, which enable them to grasp quickly any problem involving the editing of the music, as required by the producer.

Capitol is firm in its belief that, in order to do a top-quality job on all recorded material from classical to hillbilly music at all three speeds, the equipment and the personnel must be geared to meet any of the many different problems which are posed by an inventive Repertoire Department. —30—

TRY THIS NEXT TIME!

By NICHOLAS B. COOK

ALL that the little a.c.-d.c. job needed was a new 12SK7. But no! Now there was distortion—plus a sharp tinny rattle when the volume was turned up.

I checked the coupling condenser to the output stage. Leaky. Changed. Still some distortion. Condenser from volume control looked bad—was bad. Changed. Still that sharp rattle.

Checked voltages again. Now OK. Checked speaker for loose parts. OK. Sound was good at low volume. Rattle on normal volume. I disconnected speaker and tried another. OK.

Restored speaker connections. Rattle. Tried warping cone with my fingers. Rattle much less.

Plainly speaker trouble. But cone made no scraping sound when voice coil was moved by hand. Suspicious.

Now I began to figure, "This is not a mechanical rattle. It's homemade static. Made right here in the speaker!"

This happened to be a speaker with voice coil not grounded. I suspected it was grounding during motion. I tried a neon light and 120 volts in series with voice coil and ground. Glowed when cone was moved with fingers. Ohmmeter also showed intermittent contact.

I started to pick at the dust cap so I could blow out the dust or whatever was in the gap. If no luck, new cone or new speaker. Too bad. But wait! Why not try burning it out?

Instead of a 1-watt neon, I used a 25-watt lamp in series with 120 volts a.c. There was a momentary slight flash of the lamp, then no more. Motion of cone had no effect. No further continuity could be established. And no more static in the output. None at all!

Try this next time! —30—

BEAT THE TUBE SHORTAGE!

Receiving tubes are getting scarcer every day! This book shows you how to keep sets working . . . even though exact replacements are unavailable.

RECEIVING TUBE SUBSTITUTION GUIDE BOOK

BY H. A. MIDDLETON
for TV-AM-FM Receivers and Allied Equipment!

★ 2500 Radio and TV Substitutions are Listed! ★ TV Receiver Filament Wiring! ★ Heater Substitution Wiring Instructions! ★ Tube Types Classified by Functions! ★ Other Priceless Data! Place your order today! First printing sold within 21 days! Second printing is now on press and will sell as fast! Make sure of your copy!

224 pages. 8½ x 11 inches. Heavy, durable paper cover. ..... **Only $2.40**

BE EXPERT with OSCILLOSCOPES

This practical book tells you everything you should know about an oscilloscope! **WHAT** it is . . . what it can **DO** . . . and **HOW** to use it properly!

ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES

by John F. Rider and Seymour D. Uslan

The **FIRST** and **ONLY** book that so fully and clearly describes the 'scope . . . its construction . . . its capabilities . . . its applications in servicing, engineering, research . . . with thousands of time-saving and labor-saving references, charts, waveforms, etc.

All oscilloscopes produced during the past ten years, a total of more than 70 different models, are accurately described—with specifications and wiring diagrams.

Planning to buy a 'scope? This book will help you select the type best suited to your needs! If you already own one, the book will show you how to increase your instrument's **usefulness** and, naturally, its **value** to you!

We GUARANTEE that it will SAVE and EARN many, many times its cost for you!

992 Pages • 500,000 Words • 3,000 Illustrations
8½ x 11" Size • 22 Chapters • Completely Indexed
Easy to Read • Cloth Bound ..... **And only $9.00**

at TV INSTALLATIONS

Stop wasting time, patience, and money in trying to "dope out" those difficult TV installations!

TV INSTALLATION TECHNIQUES

by Samuel L. Marshall

Order this RIDER book, the **ONLY** text that gives you complete information on all the mechanical and electrical considerations.

KNOW the absolute facts about such things as ice loading, wind surface, and mounting requirements—whether for short chimney-attached mast or an 80 ft. tower, including foundation.

HAVE at your fingertips, accurate data on receiver adjustments in the home . . . municipal regulations governing the installation of TV antennas and masts in all of the major television areas in the U. S.

SURE to help you wherever and whenever an installation becomes a problem! A TIMELY and IMPORTANT book!

336 Pages • 270 Illustrations • 5⅛ x 8⅛" Size
Cloth Bound ..... **And only $3.60**

10-DAY MONEY-BACK GUARANTEE — Make these books PROVE their value! Unless you agree they are the best investments you've ever made—return the books, in good condition, for refund.

RUSH THIS COUPON TODAY

JOHN F. RIDER PUBLISHER, INC.
480 Canal Street, New York 13, N. Y.

Please send me the following books on your 10-day MONEY-BACK GUARANTEE.

RECEIVING TUBE SUBSTITUTION GUIDE BOOK 2.40
"ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES AND THEIR USES" $9.00
"TV INSTALLATION TECHNIQUES" 3.60

Name .....
Address .....
City ..... Zone .... State .....

SAVE POSTAGE. If you enclose check or money-order WITH coupon, we will prepay postage charges. Money back if you return books within 10 days.

☐ Check Encl. ☐ Money-Order Encl. ☐ C.O.D.

NEW STEEL TABLE RACK CABINETS

CABINETS, 83¾" H x 19" W x 13" D, Black Crackle Finish, Hinged Top with Lock, 2" opening in rear for cable connections etc. ea. **$5.95**
2 for $10.00

Shipped Railway Express only.

SPECIAL HERM. SEAL, Dual 20 Hy 30 MA choke, will positively carry more current. Money back if dissatisfied.....ea. $ .79
Superior Powerstat, Model 20..... 12.50
Superior Powerstat, Model 116..... 23.00
Superior Powerstat, Model 116U..... 18.00
Superior Powerstat, Model 216..... 26.00
Superior Powerstat, Model 216U..... 20.00
Superior Powerstat, Model 1126..... 46.00
Superior Powerstat, Model 1156..... 116.00
Superior Powerstat, Model 1256..... 118.00
12 HY 160 MA CHOKES **$1.25** ea., 2 for.. 1.98
SOLA Constant Volt Trans 115 V 60 CY. Out. 115 V 250VA..... 39.50
Wagge Tube Heaters, 110 V 100 W, 2 5/16" Inside Diameter. 2 for 3.90
IRC 50K 100W fixed. 2.5K 100W ADJ.. Pr. 1.25
Rheostats—50 ohm 25W, 100 ohm 25W.. ea. .59
Counter Type Instrument Dial, 3"x3", ¼" to ¼" Shaft, 3 Digit Counter..... 1.95
4MF 600 V Oil TQ Type.....5 for 2.95
7MF 600 V Oil Cap..... .90
8x8 Dual MFD 600 V Oil Cap..... 1.95
.1MF 600 V Metal Cased Oil Tub. Cap.. 10/ 1.99
Aerovox Type 484 1MF 400 V Tube Cap.10/ 2.50
CP29AIEF504M .5MF 600 V M. Tub. Cap. 10 for 4.95
1MF 600V Bath-Tub ST.....ea. .49
2MF 600V Bath-Tub ST.....ea. .75
C-D 100MF 50 VDC Electrolytic Cap..... .49
Muter KS136B 2-8M3F Var. Cap.....10 for .99
Four Quadrant Phasing, Capacitor..... 3.50
C-H Luminous Tip Bat Handle Aircraft Togg. SW., SPDT, 5A 125 V 10 for..... 1.98
SPST As Above.....10 for 1.95
SPST As Above, momentary only.....ea. .25
SPDT AS ABOVE, neutral center.....ea. .49
5 Way Binding Post, Red or Black.....ea. .40
1000KC xtal. **$2.49**; 5 Mc xtal..... 3.95
RC221 Freq. Meters, excellent cond..... 79.50
⅞" Fluted Knobs, Brass Insert, ¼"..10 for 1.20
Amphenol MIP, mica filled octal sockets. 10 for..... 1.00
Amphenol Connector AN3106-18-6P
Pilot Light Assembly, Polaroid Dimmer Type, Red, Green, Amber, White.....each .24

3" METERS

0-50 ua **$14.50**
100-0-100 ua... **8.95**
0-500 ua GE.... **6.95**
0-1 MA S Scale. **5.95**
0-1 MA DC..... **5.95**
0-5 MA SP Scale **2.95**
0-15 MA DC GE.. **4.50**
0-20 MA DC WH **4.50**
0-30 MA DC GE. **4.50**
0-50 MA DC.... **4.50**
0-80 MA DC WE **4.50**
0-100 MA DC... **4.50**
0-150 MA DC WH **4.50**
0-200 MA DC GE **4.50**
0-300 MA DC... **4.50**
0-500 MA DC... **4.50**
0-1 AMP DC WH **4.95**
0-2 Amp DC Simp **5.95**
0-300 VDC Sun. **7.95**
0-750 VDC GE... **7.95**
0-8 VAC WES 476 **4.50**
0-15 VAC GE.... **4.50**
—10+5 DB WES 301..... **10.95**
0-150 VAC..... **5.95**
30-0-30 AMP DC **$5.95**
0-50 AMP AC.... **5.95**
0-75 AMP AC.... **8.95**
JBT 3"-F FR.MTR **7.95**

2" METERS

0-500 ua SP Scales **$3.95**
0-1 MA DC SUN.. **3.95**
0-1-2 MA 506... **3.45**
0-5 MA SP Scale. **2.49**
0-500 MA..... **3.95**
0-20 MA SP Scale **3.50**
0-50 MA SP Scale **3.50**
0-25 MA SP Scale **3.50**
0-500 MA DC.... **3.50**
0-3 VDC, 1 MA.. **3.50**
0-20 VDC..... **3.50**
0-30 VDC..... **3.50**
0-30 AMP DC.... **3.50**
0-10 VAC GE.... **3.50**
0-300 VAC..... **4.95**
0-1 AMP RF GE.. **3.50**
0-2 AMP RF SO.. **3.50**
0-4 AMP RF GE.. **3.50**
0-9 AMP RF WH. **3.50**

CO-AXIAL RELAYS

Allied Control Type RA, SPDT, 6 VDC, Uses Standard Co-Ax Connectors..... **$5.95**
Above Relay for 24 VDC..... **5.95**
Set of 83-1SP Co-Ax Connectors for above... .99
Cramer Time Delay Relay, 120 Sec 120 VAC. **$9.95**
Pot-Brom. Type SP Relay, 6 VAC, DPST..... 1.95
24 VDC Relays, 5 for..... .99

CHOKES

200 HY 6MA 620 OHM, Cased.....$ **0.99**
6 HY 65 MA..... 2 for .99
10 HY 80 MA 240 OHM..... .89
7 HY 125 MA, Cased..... **$1.10 ea.; 2/ 2.00**
10 HY 150 MA 140 OHM..... 3.69
7 HY 200MA 100 OHM, Cased..... 3.49
4-16 HY 200 MA 140 OHM Swinging CH.. 4.25
3 HY 250 MA 15 OHM Herm. Seal..... 1.25
15 HY 250 MA 60 OHM, Cased..... 3.45
3-14 HY 300 MA 80 OHM Swinging CH.... 6.20
6 HY 300 MA 65 OHM, Cased..... 4.95
8 HY 300 MA 80 OHM, Cased..... 6.10
6 HY 350 MA 72 OHM, Cased..... 5.50
4 HY 400 MA 100 OHM, Cased..... 5.95
6 HY 450 MA 80 OHM, Cased..... 6.50
7 HY 750 MA 40 OHM, Cased..... 11.50

115V FILAMENT TRANSFORMERS 60 CY

2.5 VCT 10 A. 10KV Insulation..... **$4.50**
2.5 V @ 6 Amp., 2.5 V @ 6 Amp..... 3.45
5 VCT 3A, 2.5 KV Insulation..... 2.95
5 V 20 A, 2.5 KV Insulation..... 6.85
6.3 V 1.2 A..... .85
6.3 V 3 Amps..... 2.45
6.3 V 12 Amps..... 3.95
6.3 V 4 Amps, 6.3 V 4 Amps..... 2.95
6.3 V 3.5 A, 2.5 V 3 Amps ea..... 3.95
6.3 V 3A, 2.5 V 6 AMP Herm Seal..... 3.49
6.3 V 8 Amps..... 2.95
10 VCT 10 A, 2.5 KV Insulation..... 6.00
6.3 V 12A, 6.3 V 2 A Herm Seal..... 4.50

115 V POWER TRANSFORMERS 60 CY

435 VCT 145 MA, 6.3 V 3A, 5V 3A.....$ **2.49**
700 VCT 90 MA, 6.3V 4A, 5V 3A..... 3.50
700 VCT 150 MA, 5V 3A..... 2.95
800 VCT 200 MA, 6.3V 4A, 5V 3A..... 6.50
800 VCT 360 MA, 6.3V 10.8A, 5V 6A, 5V 2A 9.50
750-600-0-600-750 225 MA..... 8.95
3200 VCT 450 MA..... 24.50
115 V. 230 V TAP PRI.—850 VCT 280 MA —36V 7A—6.3V 3A—5V 3A, Cased..... 12.50

OIL CAPACITORS

7 MF 330 VAC. .**$0.95**
.5 MF 600 VDC.. .45
2 MF 600 VDC... .79
4 MF 600 VDC... .99
6 MF 600 VDC... **1.05**
10 MF 600 VDC. **2.49**
2 MF 1000 VDC. **1.95**
5 MF 1000 VDC. **1.95**
10 MF 1KV DC.. **3.25**
15 MF 1KV DC.. **3.95**
2 MF 1.5 KV DC. **1.75**
4 MF 1.5 KV DC. **2.75**
6 MF 1.5 KV DC. **2.95**
.1 MF 2000 VDC. **1.79**
.25 MF 2000 VDC. **$1.95**
1 MF 2000 VDC. **2.10**
2 MF 2000 VDC. **2.75**
4 MF 2000 VDC. **4.50**
8 MF 2000 VDC. **5.95**
.5 MF 2500 VDC. **1.39**
.25 MF 3000 VDC **2.25**
.5 MF 3000 VDC. **1.49**
3 MF 4000 VDC. **5.95**
1 MF 5000 VDC. **5.50**
2 MF 5000 VDC. **8.50**
4 MF 5000 VDC. **11.50**
2 MF 6000 VDC. **12.95**
.1 MF 7500 VDC. **1.25**

TERMS: 25% Deposit with order, balance C.O.D. Rated firms open account

POLY-TECH
919 Dawson St., New York 59, N. Y.
Tel. MUrray Hill 6-2650

MARS Station of the Month

MARS BEAMS WEEKLY BROADCASTS

MARS—Army Headquarters station, WAR, located at the Pentagon Building, Washington, D. C., broadcasts a weekly message each Tuesday at 0100Z and at 0400Z. (This is Monday at 8 p.m. and 11 p.m., Eastern Standard Time; Monday at 7 p.m. and 10 p.m., Central Standard Time; Monday at 6 p.m. and 9 p.m., Mountain Standard Time; and Monday at 5 p.m. and 8 p.m., Pacific Standard Time.)

Simultaneous broadcasts are made on frequencies 3497.5 kc., 6997.5 kc., 14,405 kc., and 20,994 kc. Each message is sent three times, once at 10 words per minute, once at 15 words per minute, and once at a higher rate of speed—usually 20 words per minute.

Designed especially to transmit quasi-official traffic and training information to MARS members, the broadcast offers an excellent opportunity for all amateurs to build up their code proficiency.

THE Tar Heel installation, A4WBK/K4WBK, located at Raleigh, North Carolina, has been named MARS Station of the Month by Major E. L. Nielsen, Chief of MARS-Army. The station is under the direct supervision of Lieutenant Colonel Gus A. Schattenberg, North Carolina Military District Headquarters. Sergeant Stanley J. Dvorak, A4PUK/W4PUK, is chief operator.

The station operates eight hours a day, five days a week, but could be placed on a 24-hour basis in case of disaster or emergency.

A4WBK serves the North Carolina Military District, commanded by Colonel R. F. Perry, and is net control station for the North Carolina State Net, which is under direct control of the Signal Officer, Third Army, Fort McPherson, Georgia.

The service which singled A4WBK out as Station of the Month is believed to be unique. The station regularly provides news for an Army information radio broadcast service.

The Public Information Office of the North Carolina Military District, headed by Captain Thomas B. Sawyer, writes and produces a news summary which is made available, free of charge, five days a week, to all radio stations in North Carolina.

Technical assistance in the production and dissemination of the show is furnished by personnel of Raleigh radio station WNAO. The purpose of the newscast is to furnish up-to-the-minute information to homefront listeners about Tar Heels in the service. Much of this information is available from the Armed Forces Press Service and other normal Army news channels. Local features and personalized stories are seldom available.

Sergeant Robert Erlander was assigned to organize and direct a news-gathering service. He uses MARS net-

Sgt. S. J. Dvorak (A4PUK) operates A4WBK for station visitors B. L. Porter, WNAO chief engineer; Ed Kirk, WPTF news director; Lt. Col. Gus Schattenberg, supply officer of North Carolina Military District; and D. A. Brown, WNAO program and commercial manager.

works in North Carolina to obtain *local* news for parents and relatives at home about enlistees and inductees who are receiving their first taste of Army training.

Station A4WBK maintains radio traffic schedules Monday through Friday with military installations in North Carolina. This facility makes possible on a PIO-to-PIO basis the gathering of news and feature material. MARS nets handle the material as quasi-official, administrative traffic in the public interest.

The radio show, called "News from MARS", is also transcribed and wire recorded for rebroadcast. The transcriptions are used by the Army in its information program. —30—

New Ham Rules
(*Continued from page* 38)

the Novice Class, may be renewed upon proper application stating that the applicant has lawfully accumulated a minimum total of either 2 hours' operating time during the last 3 months or 5 hours operating time during the last 12 months of the license term. Such "operating time," for the purpose of renewal, shall be counted as the total of all that time between the entries in the station log showing the beginning and end of transmissions and during a "sequence of transmissions." A statement that the applicant can send by hand key, *i.e.*, straight key or any other type of hand operated key such as a semi-automatic or electronic key, and receive by ear, in plain language, messages in the International Morse Code at a speed of not less than that which was originally required for the class of license being renewed must be included.

Amateur operator licenses are normally valid for a period of 5 years from the date of issuance of a new or renewed license, except the Novice Class which is normally valid for a period of 1 year from the date of issuance. Modified and duplicate licenses shall bear the same date of expiration as the original licenses.

Examination Elements

Examinations for amateur operator privileges will comprise one or more of the following examination elements:

Element 1(A)—Code test at five (5) words per minute.

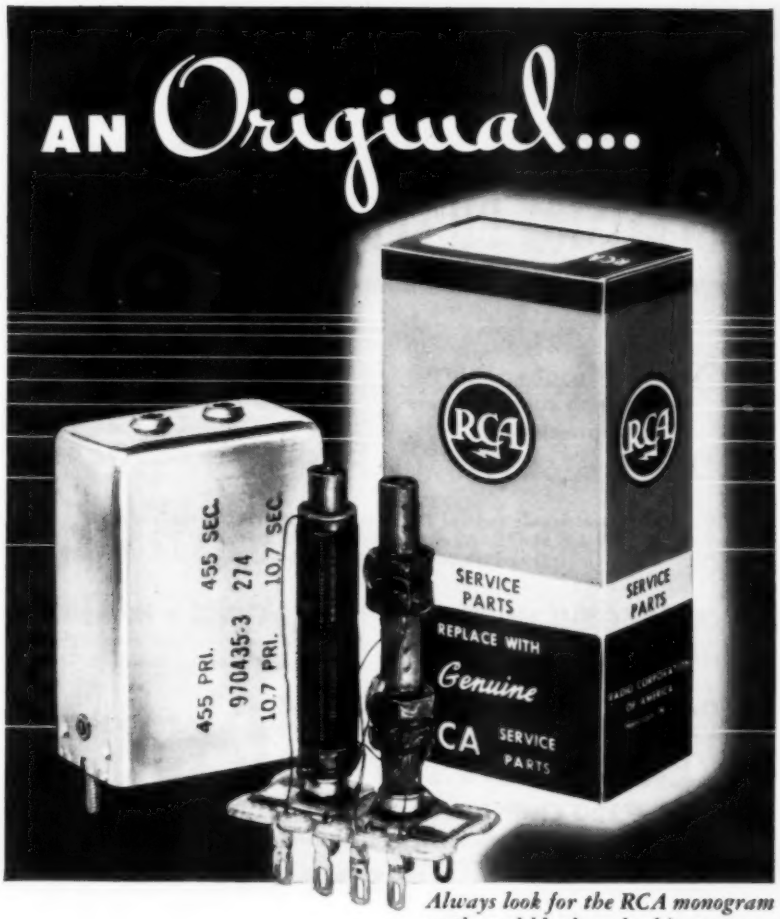
Element 1(B)—Code test at thirteen (13) words per minute.

Element 1(C)—Code test at twenty (20) words per minute.

Element 2—Amateur radio operation and apparatus, including radiotelephone and radiotelegraph.

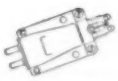
Element 3(A)—Rules and regulations essential to beginner's operation, including sufficient elementary radio theory for the understanding of those rules.

Element 3(B)—Provisions of treaties, statutes, and rules and regulations affecting all amateur stations and operators.



Always look for the RCA monogram on the red-black-and-white carton

It takes an RCA Original... to restore original RCA performance



CUSTOMERS COUNT ON YOU to return their RCA Victor Radios, Television Receivers, and Record Changers to their *original* high performance standards . . . by using genuine RCA service parts in your work.

Fortunately, that's easy . . . because RCA stocks over *40,000 different parts* in order that you may repair RCA Victor instruments—with the least amount of effort and with the assurance that original performance standards can be restored.

Genuine RCA service parts are readily available from your local **RCA Parts Distributor.**

NOW—Volume V, RCA Victor Service Data, covers all 1949 RCA Victor radio and television receivers and phonographs. Get your copy today. Only $5.00 at your RCA Parts Distributor.

RCA **RADIO CORPORATION of AMERICA**
ELECTRONIC COMPONENTS HARRISON, N. J.

Don't throw away your old, burnt out or broken neck TELEVISION PICTURE TUBE

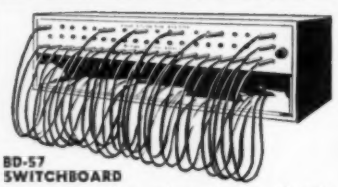
We can replace them with a completely rebuilt* tube which carries a new tube guarantee.

10"	$15.95
12"-12½"	18.95
14"	19.95
15"-16"-17"	29.95
19"	44.95
20" Rect.	46.95

All prices include Federal Excise Tax and are FOB, Brooklyn, N. Y.
Send 25% with order plus picture tube.
Prices subject to change without notice.

*NEW SCREEN • NEW GUN • NEW COATINGS • NEW BASE

"ELECTRONIC" APPLIANCES, INC.
9220 Church Avenue, Brooklyn 12, N. Y.



BD-57 SWITCHBOARD
Perfect for Audio patch panels, etc. 60 jacks, 27 plugs & cords, the manual included.
NEW $14.95

SCOOP—Sound-Powered Handsets
Brand New—$19.95 Pair

Running Time Meters
Sangamo Model 17-B
In hours & 1/10th hours to 9999.9 110/230 V, 60 cycles, A.C. (Please specify voltage.)
110/230 V.....$4.95
230 V only.... 3.95

Variable Reset Timers
Sangamo Model 21
Opens circuit from 0 to 3 minutes, calibrated in 5 second intervals. Will handle 10 Amps or more (please specify voltage).
110/230 V...$4.95 230 V only...$3.95

Tremendous Assortment of Mica and Oil filled Condensers, wire-wound Resistors, Relays, Transformers, etc.

Write for Quotations on Your Requirements

FOB Oakland, 25% cash with order, balance COD.

EMMONS RADIO SUPPLY
405 10th St. Oakland, Calif.

FOR THE "GOLDEN EAR" CROWD

THE STRAIN-SENSITIVE PHONOGRAPH PICKUP

Here's why this truly faithful reproducer appeals to people gifted with the "Golden Ear" . . . why the STRAIN-SENSITIVE PICKUP developed by the PFANSTIEHL CHEMICAL COMPANY brings out the brilliance of great voices and orchestras . . . the latent music on your records that other pickups leave untouched.

- The STRAIN-SENSITIVE PICKUP is an amplitude transducer with a CONSTANT RESISTANCE of about 250,000 ohms.
- Signal output is at a practically CONSTANT IMPEDANCE LEVEL.
- Excellent Transient Response.
- NO DISTORTION, phase shift or evidence of intermodulation is audible.
- LINEAR RESPONSE, free from peaks or resonances.

Cartridges are available for both standard and micro-groove, and can be had with Famous PFANSTIEHL M47B Precious Metal Alloy or diamond tipped styli.

A special preamplifier is necessary to provide the correct D.C. voltage for the pickup element and to provide the first stages of signal gain. Four styles are ready, or, if you prefer, you can build your own from the circuit in the literature.

Ask your radio supply man, or write today for complete FREE INFORMATION.

PFANSTIEHL
CHEMICAL COMPANY
101 Lake View Avenue, Waukegan, Illinois

Element 4(A)—Technical, operational, and other matter specifically applicable to the operation of amateur radiotelephone stations.

Element 4(B)—Advanced radio theory and operation as applicable to modern amateur techniques, including, but not limited to, radiotelephony, radiotelegraphy, and transmissions of energy for measurements and observations applied to propagation, for the radio control of remote objects and for similar experimental purposes.

Examination Requirements

Applicants for original licenses will be required to pass examinations as follows:

(*a*) *Amateur Extra Class:* Elements 1(C), 2, 3(B), and 4(B).

(*b*) *Advanced Class:* Elements 1(B), 2, 3(B), and 4(A).

(*c*) *General Class:* Elements 1(B), 2, and 3(B).

(*d*) *Conditional Class:* Elements 1(B), 2, and 3(B).

(*e*) *Technician Class:* Elements 1(A), 2, and 3(A).

(*f*) *Novice Class:* Elements 1(A) and 3(A).

An applicant for a higher class of amateur operator license who holds a valid amateur operator license issued upon the basis of an examination by the Commission will be required to pass only those elements of the higher class examination that were not included in the examination for the amateur license held when such application was filed. However, credit will not be allowed for licenses issued on the basis of an examination given by other than personal FCC examination.

An applicant for Amateur Advanced Class operator license will be given credit for examination element 4(A) if within 2 years prior to the receipt of his application by the Commission he held Class A privileges or an Advanced Class license.

An applicant for any class of amateur operator license, except the Extra Class, will be given credit for the telegraph code element if within 5 years prior to the receipt of his application by the Commission he held a commercial radiotelegraph first or second class operator license issued by the Federal Communications Commission.

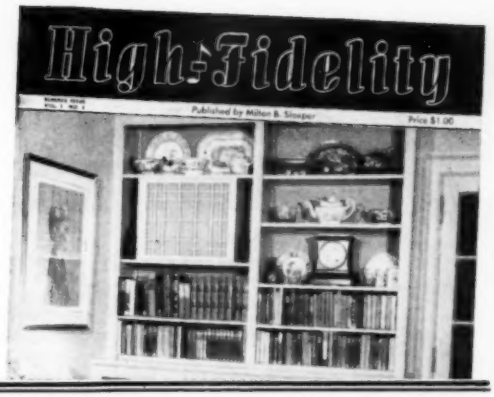
The Novice class of license will not be issued to anyone who has previously held an amateur license of any class issued by an agency of the United States government, military or civilian.

No examination credit, except as herein provided, shall be allowed on the basis of holding or having held any amateur or commercial operator license. There have been minor revisions in some of the frequency allocations in the 160 meter band. Other than this, the frequency allocations remain the same. An additional 50 kilocycles have been authorized for A3 operation on the 75 meter band making the phone portion now read 3800 to 4000 kilocycles. The portion from 3800 to 3850 may be used for NBFM.

—30—

If you're an AUDIO-PHILE*

*People who enjoy the entertainment provided by fine audio reproduction



You will want this new kind of magazine... devoted to the interests of all Audio-philes

for your listening pleasure: Whatever your interest in radio and recorded music, whether you are a critical listener or a technically-minded hobbyist, you'll say of HIGH-FIDELITY Magazine: "This is just the kind of publication I want. It is edited exactly to suit *me!*"

better reproduction: Helping readers to find the kind of music they want, and to reproduce it the way they want to hear it is one of the basic purposes of HIGH-FIDELITY. You will find information on both modest and expensive installations, each planned according to best audio practice.

custom installations: HIGH-FIDELITY will give you a wealth of ideas on space-saving units for small apartments, built-in designs for private homes, demonstration installations for advertising agencies, speaker systems for residence organs, and plans for home and studio recording.

you can build your own: Looking for instructions on building equipment in your home workshop? Then look to HIGH-FIDELITY for detailed instructions that follow the very latest engineering developments and techniques, modified to suit the facilities you have at your command.

about records, new and old: You'll be amazed and delighted to see the results of research and consultations with music authorities and collectors represented in this department, carefully compiled and classified, covering all types of recordings to meet all tastes and purposes.

if you're a beginner: Maybe, as an Audio-phile, you are now on the outside, looking in. If so, HIGH-FIDELITY has a special department for you with a door-mat that says *Welcome* to all those who want to join the fraternity, and learn the mysteries and delights of fine audio reproduction.

all this, and more: These are only *some* of the features in HIGH-FIDELITY. Not the least important is the section devoted to new equipment and techniques, with detailed illustrations showing how to use them most effectively. *SEE FOR YOURSELF. Order a Charter Subscription TODAY.*

This Will Interest You—

CHARLES FOWLER, editor of HIGH-FIDELITY, brings to this publication a broad background of experience. He has studied extensively abroad, he is a graduate of Harvard University, and he has the technical knowledge and workshop skills which qualify him as a true Audio-phile.

He knows both original and recorded music, as an inveterate concert-goer and a collector of records. In these activities he has the support of Mrs. Fowler, who is an accomplished musician.

You will find that your Editor understands both the interests of those to whom music is more important than the equipment which produces it, and of those critical listeners to whom the technical perfection of their equipment is paramount.

HIGH-FIDELITY is not an engineering or trade paper. It is strictly for Audio-philes, authoritative, readable, filled with new ideas and information available from no other source. It is 8¾ by 11½ ins. in size, handsomely illustrated, and beautifully printed by Rumford Press, where such publications as Readers' Digest and Atlantic Monthly are produced.

A year's subscription (4 big quarterly issues) will give you a full 12-month's supply of information, supplemented by the Readers' Service Department always ready to help you. And here is a Charter Subscription form for your convenience:

HIGH-FIDELITY MAGAZINE
Radio Building, Great Barrington, Mass.

I want to be a Charter Subscriber to HIGH-FIDELITY Magazine. I enclose my remittance for:

☐ $3.00 for one year (SAVE $1.00)

☐ $6.00 for three years (SAVE $6.00)

Name:.....

Address:.....

.....

Add 50c per year for Canada, $1.00 foreign.

High-Fidelity

Published by Milton B. Sleeper

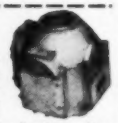
Radio Building, Great Barrington, Massachusetts

Lowest prices!

SYNCHRON MOTOR
Model 600, 1 RPM, 115 Volts, 60 cycles. Brand New.
Special Price $2.75 each

BEAM INDICATOR
1-82F Compass Indicator. 0-360°-5 in. dial. 26 v 400 cy. 8-12 v. 60 cy. Ideal position indicator.
Price $3.95 each

C-1 AUTOPILOT VERTICAL GYROS



May be used to conduct many interesting and amusing experiments. Operates from 24 V. DC or may be operated for short periods on 110 V. AC. Gyro will run for approx. 15 minutes after actuating. Size—approx. 8"x8½"x8½". Less Amphenol Connector.
Special **$4.95**

C-1 AUTOPILOT AMPLIFIERS
Three channel servo amplifier consisting of many valuable electronic parts including 6 relays, 7 tubes.
With Tubes.....$8.95
Less Tubes.....$5.95

METERS

J.B.T. Frequency Meter Type 30F 48-62 cycles 100-150 volt..... $ 9.95
G.E. Type DW volts-amp meter 0-30 vdc 0-60 amps d.c. less shunt..... $ 4.95
S Meters—Weston Model 606 range 2.5 ma. movement ..... $ 3.50

DYNAMOTORS

G.E. Type D-101 input 27 vdc @ 1.5a output 285 vdc @ .060a..... $ 4.95
Weston Electric DM36D 28 vdc @ 1.4a output 220 vdc @ .080a..... $ 5.50
Pioneer Gen E Motor input 12 vdc @ 9.4a output 275 @ .110a 500 vdc @ .050a.... $11.95
Bendix PE94C input 28 vdc @ 10.5a output 300 vdc @ .260a 150 vdc @ .010 and 14.5 vdc @ 5.0a..... $16.50

AIRCRAFT INSTRUMENTS

Turn & Bank Indicators Pioneer 1719-1AF-A1 ..... $15.00
Altimeters Kollsman 371803-0-40,000 ft.. $ 9.95
Air Speed Indicator Pioneer 1403-1N-B1 0-300 m.p.h. 0-250 ..... $ 7.50
Climb Indicator—Pioneer 1636-6H-B1..... $12.50

RELAYS

Cutler-Hammer Type 6041H30B 12 vdc 50 amp contacts $2.95
6½ vdc DPST low voltage contacts flange mount 49c
G.M. Lab. 12942 6-12 vdc make one break one heavy contacts 69c
G.M. Lab. 12849 6-12 vdc DPST heavy contacts. 69c
Clare A 15764 150 ohm coil telephone type break three make two..... 95c
Clare A 7409 3300 ohm telephone type SPST $1.19
M. M. Amplifier—Turbo Supercharger by Allen—115 v 400 cy. new with tubes..... $6.50
U.S. Army Telephone headgear and microphone set. 3 ft. cable with connector—new..... $3.25
Explosion proof box—10"x8"x6½" removable top—1" threaded side connector—Ohmite..... $3.50
Heating elements—250 wts. 220 v. 19" long by 1" dia. Ideal for small oven..... $1.95
U.S. Army Signal Flasher—24 v easily converted 6 v by changing seal beam—large trigger grip—just the thing for spotlight..... $4.75
Selenium rectifier—full wave—36 v @ 1.5 amp. $1.29
Circle Cutter—Up to 8" hole—complete..... 95c
Army telegraph key—metal cover—3' cord..... 59c
Microphone transformer—1½" square, 3" leads 39c
32 mfd electrolytic capacitor—450 v tubular... 89c
2 mfd—600 vdc oil filled capacitor..... 44c
1000 ohm carbon pot—2 watt—1¼" shaft..... .39

TUBES

6SN7 ..$1.88 7Y4 .... 89c
7N7 ....$1.49 6H6 .... 89c C1B $3.98
7F7 .... 89c 7V7 .... 89c

TERMS: 20% cash with order—balance C.O.D. Orders accompanied by payment in full must include sufficient postage, otherwise shipment will be made via Railway Express collect. Minimum order $2.00.

Electro Devices
INCORPORATED
247 BROADWAY PATERSON, N.J.

Sound Engineering

(*Continued from page 55*)

tion will be required in recording applications of this type.

For recording music, dialogue, or vocal selections, it is desirable to separate the artist from the orchestra by the use of "flats". A flat consists of a group of hinged panels constructed of acoustic tile on a wooden framework, with a glass panel in its center. The flat is placed around the artist and the microphone, with the glass window facing the musical director. Separating the artist and microphone from the orchestra in this manner allows the sound mixer to secure better isolation and balance between the orchestra and the artist. No equalization is used in the vocal microphone circuit.

When recording vocal and piano, the vocalist should be placed near the center of the studio to reduce reflections from the walls. The piano top should be open, with the open side about 12 feet from the artist. The artist is placed 4 to 6 feet away from the microphone between the microphone and the piano, with his back to the piano. A microphone with a bi-directional field pattern (ribbon) is the most suitable for this type of pickup. Reflections from the rear of the microphone must be held to a minimum. Each studio presents its own problems, and to obtain the best results for a particular type of pickup will require a considerable amount of experimentation with microphone placement.

A number of excellent articles have appeared in this magazine on the subject of microphone placement and it is suggested that the reader refer to them for additional information.

To summarize, the size of the studio will be dictated by the maximum size orchestra to be recorded and the type program material. The studio should be proportioned to give a ratio of average height, width, and length of 1: 1.6: 2.5. For a volume of 16,000 cubic feet this will result in a studio of 16′ x 25′ x 40′.

Large parallel surfaces should be avoided and several polycylindrical diffusers used to give a high amount of diffusion of the sound to reduce the possibility of standing waves.

The shape of the diffusers (radius) is varied as well as the size. The bracing of the panels is staggered to vary the resonant frequencies.

The air conditioning system must be shock mounted and the inside of vents treated acoustically and baffled to reduce the entrance of extraneously generated noises.

If desired, carpeting may be placed on the floor for small orchestras, to obtain additional absorption. A small rug placed under microphones used for vocal pickup will prevent reflections from the floor.

For dialogue stages, the principal sound treatment should be that of the exterior walls, air conditioning, and doors, and the material used in the set

ATTENTION
ALL ELECTRONIC-TELEVISION ENGINEERS

For more than 6 years RADIO-ELECTRONIC ENGINEERING, a special edition of RADIO & TELEVISION NEWS, has kept alert engineers dependably and thoroughly informed on all that's really important in electronic engineering.
Selected and exclusive articles and other specialized features of practical and lasting value to electronic engineers are added to the content of the regular edition of RADIO & TELEVISION NEWS.
Subscribers to the regular edition may change to the RADIO-ELECTRONIC ENGINEERING edition by remitting an extra dollar for each 6 months of the unfulfilled portion of their subscriptions.
New subscribers please use the lower half of order card in this issue.
The RADIO-ELECTRONIC ENGINEERING edition is available only by subscription.

RADIO-ELECTRONIC Engineering
edition of
RADIO & TELEVISION NEWS
185 N. Wabash Ave.
Chicago 1, Ill.

MIDWEST
Presents its NEW 1951 Line of
Mammoth New 19½-Inch
TELEVISION
and
5 WAVE BAND RADIOS
In Beautiful Console and Complete Chassis

EASY TERMS

Midwest offers a complete line of 19½" and 16½" Television models in consoles, console combinations, and ready-to-use chassis complete with 12" speaker. Don't buy any radio or television receiver until you've seen the new 1951 Midwest line—the finest in 31 years.

BUY DIRECT FROM THE MIDWEST FACTORY

SEND THIS COUPON ON 1¢ POST CARD FOR NEW 1951 FREE 4 COLOR MIDWEST CATALOG

MIDWEST RADIO & TELEVISION CORP.
Dept. 37-L, 909 Broadway, Cincinnati 2, Ohio
NAME _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

construction of such kinds and types that the reflections are reduced to a minimum.

To insure the best quality of pickup, the microphone must be suspended from a boom, so that it can be "panned" with the movements of the actors. A dialogue equalizer must be employed to suppress the low frequencies to produce maximum intelligibility and naturalness of speech.

Portable flats should be used to secure separation between the orchestra and a vocal or dialogue microphone, when recording the two simultaneously.

The subject of recording studios will be further discussed in a subsequent article.

(*To be continued*)

Within the Industry

(*Continued from page* 26)

Signal Corps depot on a 1400 acre tract at Tobyhanna, Pa., near Scranton and Wilkes-Barre. Completion is scheduled for early 1953 and will provide 2,000,000 square feet of storage space . . . The **INTERNATIONAL RECTIFIER CORPORATION** has added a second story to its plant located at 6809 S. Victoria Avenue, Los Angeles 43. The new addition was built to handle increased production requirements . . . **MATTISON TELEVISION AND RADIO CORP.** of New York City has just opened a new cabinet factory at 742-760 Wythe Avenue in Brooklyn. The new factory provides 20,000 square feet of manufacturing space . . . **ALLEGHENY PLASTICS, INC.,** 618 Chestnut Road, Sewickley, Pa. has expanded its production facilities for printing, laminating, and forming plastics . . . **VARIETY ELECTRIC COMPANY, INC.** has recently moved into a new building at 468-470 Broad St. in Newark, New Jersey. In addition to providing increased warehousing space the new location affords convenient parking facilities for customers . . . **CADILLAC ELECTRONICS CORP.** has moved to 19 West 26th St., New York.

* * *

ROBERT F. FIELD, who has been associated with *General Radio Company's* Engineering Department for many years, recently retired after 21 years of service.

Prior to joining *General Radio*, Mr. Field was a member of the faculty of Harvard University. He is well-known for his work in impedance standardization, electrical measurements, particularly with bridge circuits, and the study of dielectric materials.

He is a Fellow of the IRE and the American Association for the Advancement of Science, a member of the American Institute of Electrical Engineers, the American Society for Testing Materials, and the American Physical Society. He is a Phi Beta Kappa and a member of Sigma Xi. —30—

T.V. MANN Says:
"If Sets Get Scarce I'll Make Money on Teletowers"
I'm all "set" for any set shortage! Teletowers—the popular "people's choice" among tripod-type towers give *improved reception* with sets new . . . reconditioned . . . or old.
New top-section engineering improvements have increased Teletowers' lead in all-around construction. The market's ripe . . . the PRICE IS RIGHT! So why not get the hottest news in television—the complete information given in the *new* Teletower bulletin? Use the coupon for convenience.
T.V. MANN Says:
"And Here Are Two Other Money-Makers for a Scarcity Market"
Pole Base Mount—PBM1
Guy Ring and Collar Sets
T.V. MANN Says:
"Don't Take my Word—Mail the Coupon!"
Penn Boiler & Burner Mfg. Corp.
Dept. N6, Lancaster, Pa.
Please send me NEW, free bulletins on Teletowers and Tennamast Hardware.
Name . . . . . .
Company . . . . . .
Address . . . . . .
PENN Teletowers Driftowers Tennamast
PENN BOILER & BURNER MFG. CORP. LANCASTER, PA.

YOU CAN STILL
Buy—
TROUBLEPROOF TELEVISION
THE 630 TV WILL WORK WHERE OTHERS FAIL!

Own the Television Set preferred by more Radio and Television Engineers than any other TV set ever made!

THE ADVANCED CLASSIC 630 TV CHASSIS
With the latest 1951 improvements the 630 TV will out-perform all other makes in every way. The new, high efficiency, 30 plus tube circuit should not be compared to the cheaply designed 24-tube sets now being sold under standard brand names.

• **Greater Brilliance**
Assured by the new 14-16 KV power supply.

• **Flicker-Free Reception**
Assured by the new Keyed AGC circuit—no fading or tearing of the picture due to airplanes, noise or other interference.

• **Greater Sensitivity**
Assured by the new Standard Tuner, which has a pentode RF amplifier and acts like a built-in High-Gain Television Booster on all channels! The advanced 630 chassis will operate where most other sets fail, giving good performance in fringe Areas, and in noisy or weak locations.

• **Larger—Clearer Pictures—for 16", 17", 19" or 20" Tubes**
Assured by advanced circuits. Sufficient drive is available to easily accommodate any tube.

• **Trouble-Free Performance**
Assured by use of the finest materials such as quality condensers, overrated resistors, RCA designed coils and transformers, etc.

• **RMA Guarantee**
Free replacement of defective parts or tubes within 90-day period. Picture tube guaranteed fully for six months at no extra charge!

PRICE COMPLETE LESS PICTURE TUBE.....NET **$164.95**
NO ADDITIONAL TAXES TO PAY

TELEVISION PICTURE TUBES
Standard Brands
SIX-MONTH GUARANTEE

12½" (Black or White).... **$26.50**
Glass 14" Rectangular (Blk.) **$29.50**
Glass 16" Round (Black) **$39.50**
Glass 16" Rectangular (Blk.) **$39.50**
17" Rectangular (Blk.) $42.50
19" Round (Blk.) $69.50
20" Rectangular (Blk.).....$73.50

TELEVISION CABINETS
16" or 17" Table Model Cabinet
A gorgeous table model cabinet for the average size living room. Outside dimensions 23¾" Wide x 24" High x 24" Deep. Walnut or Mahogany..... **$44.50**

16" Economy Consolette Cabinet
An exceptional buy in a consolette cabinet made of fine veneers to house the 630 TV chassis, tube and speaker. Outside dimensions are 39" High x 24" Wide x 22¾" Deep. **$49.50**

16" or 17" PERIOD CONSOLE
Handsomely styled for the conventional living room. Has a drop-door panel to conceal control knobs when desired. Outside Dimensions are 41" High x 26" Wide x 24" Deep. **$64.95**

Above cabinets available for 19" or 20" tubes at $5.00 additional.

We are now authorized Distributors for the famous Masco line of high fidelity Amplifiers, Public Address Systems, Tape Recorders, Inter-Communication Systems, etc. Write for latest Catalog.

All Merchandise Subject to Prior Sale. All Prices Subject to Change without Notice.

WRITE FOR COMPLETE CATALOG N-4

EDLIE ELECTRONICS INC.
154 Greenwich St. New York 6, New York

FOUR BANDS With A Flat Line

Additional details on the use of a single wire antenna to cover 80, 40, 20, and 10 meter bands.

By
AUBREY MEADOWS,
W4OLM

AFTER reading with considerable interest the article appearing in the February 1950 issue of RADIO & TELEVISION NEWS, entitled "A Two-Band Piece of Wire" by Karl Dreher (WØW0), we have nothing but the highest praise for him.

Like Mr. Dreher and many other amateurs, we desire to operate on all the four major bands, and also like many others, we are located in an apartment and cannot erect rotary arrays and other such fine but often objectionable-appearing radiators. We have given conventional multi-band antennas of the zepp and long-wire varieties what we consider to be fair trials, but the consequent vertical radiation from tuned feeders only serves to aggravate our broadcast interference.

For the benefit of those who do not have the February issue, the antenna described consisted of a flat top portion cut to resonate at the lowest frequency band to be used, while the antenna is fed by means of a 300 ohm line.

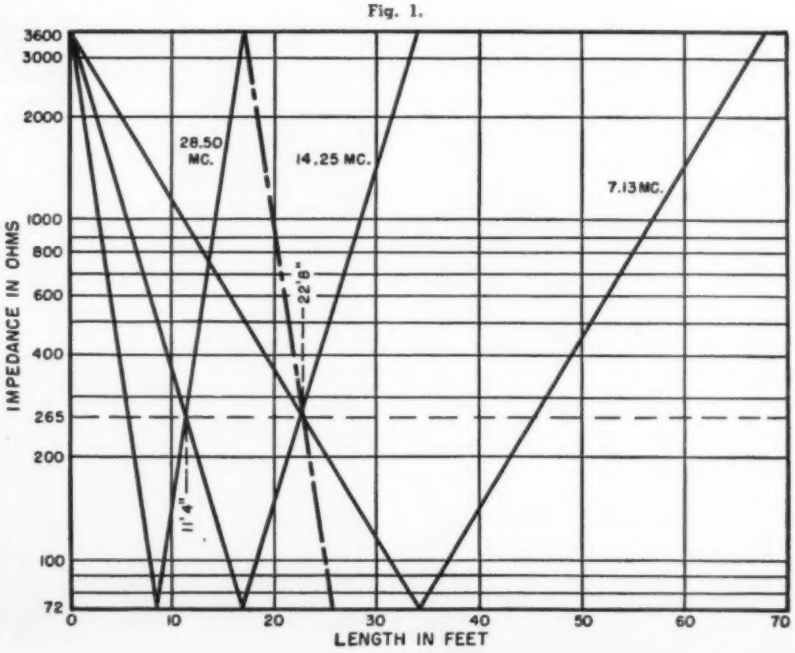
The point of attachment for the feedline was determined from a chart similar to Fig. 1.

The antenna is cut at the proper point and the feedline connected at this point. Measurements given on the chart are made from one end of the antenna.

Upon perusing Mr. Dreher's article, we immediately questioned his statement regarding the use of a 68-foot radiator on either the 40- and 20-meter bands or the 20- and 10-meter bands. The theory upon which he based the design of his antenna system we have found to be quite sound, insofar as he carried out his work. We do not, however, agree with his statement, "Ten and twenty meters at 11 feet, or twenty and forty meters at 22 feet—take your choice; it can't be both combinations with a single connection." It will be noted that, in basing his graph of impedance *versus* length of radiator, he only plotted the first half-wavelength as regards impedance on each band considered.

Consideration of his impedance-length diagram led us to question why he did not plot the second half-wavelength for the 10-meter harmonic. We

Fig. 1.



the new Smitty Jr. saves time and temper!

Designed to save radio and television mechanics' time and temper, the new Smitty Jr. has combined the six sizes of socket head wrenches you need most in one sturdy knife-like handle.

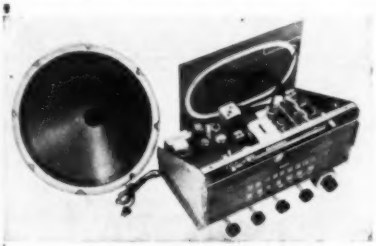
No wasted time looking for the right sized wrench... it's always handy. The unique design and huskiness of the Smitty Jr. gives you greater leverage at every angle.

Made from high quality, tempered steel... sizes .050", 1/16", 5/64", 3/32", 1/8", 5/32". Get yours today!

H. D. HUNTER COMPANY
3499 E. Fourteenth Street • Los Angeles 23, California
Dealers: Write for name of nearest jobber.

SAVE

THAT GOOD LOOKING OLD CONSOLE—
REPLACE YOUR OBSOLETE RADIO
with a modern, easily installed
ESPEY AM/FM CHASSIS
and your favorite console is *"right-up-to-date"*



Rated an excellent instrument by America's foremost electronic engineers. Fully licensed under RCA and Hazeltine patents. The photo shows the Espey Model 511-B, supplied ready to play. Equipped with tubes, antenna, speaker, and all necessary hardware for mounting.

NEW FEATURES—Improved Frequency modulation circuit, drift compensated • 12 tubes plus rectifier, electronic tuning eye and pre-amplifier pick-up tubes • 4 dual purpose tubes • High quality AM-FM reception • Push-pull beam power audio output 10 watts • Switch for easy changing to crystal or variable reluctance pick-ups • Multi-tap audio output transformer supplying 4—8—500 ohms.

Makers of fine radios since 1928.

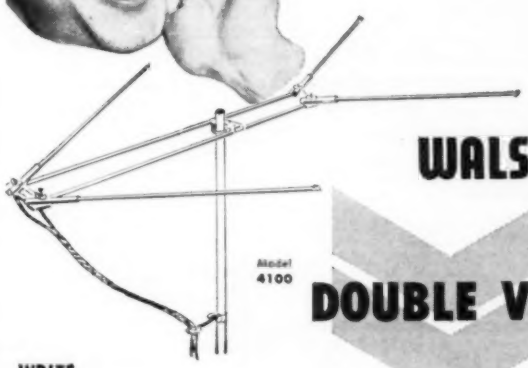
Write for literature RN for complete specifications on Model 511-B and others.

ESPEY MANUFACTURING COMPANY, INC.
TEL. TRafalgar 9-7000
528 EAST 72nd STREET, NEW YORK 21, N. Y.

Great News!

CAN'T BREAK

WON'T SAG



WALSCO

DOUBLE VEE

ANTENNA

WRITE FOR BULLETIN NO. 60—N

A great, new engineering idea! Walsco Double-Vee Antenna with "TWIN-TUBE" element construction eliminates sag . . . Guaranteed not to break. Elements stay firm in perfect alignment for lasting high gain performance. Highly directive . . . extra high gain on all channels. No mechanical failures even under severe weather. New molded insulators guaranteed unbreakable. Outstanding and lasting dielectric properties. Completely assembled . . . only 4 wing nuts to tighten.

WALSCO

Walter L. Schott Co.
Los Angeles 18, Calif.
Chicago 6, Ill.

WHOLESALE RADIO
HAS WHAT IT TAKES FOR
BEST TV PICTURE

Get Best Picture at Low Cost
ASTATIC TV BOOSTER

Model BT-1 $19.50

Uniform hi-gain on all channels. Low noise design. Continuous tuning through TV and FM bands. Provides for either 72 ohm or 300 ohm impedance input and output. Attractive metal cabinet with rich mahogany woodgrain finish.

Model BT-2.....$20.97

FOR BEST TV RECEPTION
ROTATE ANTENNA WITH
RADIART TELEROTOR

TR-2 With Direction Indicator $29.97

Streamlined weather-proof design. Durable, sturdy construction. 12 heavy duty ball-bearings. Heavily reinforced die-cut housing. Precision gears. Positive stop at end of rotation. Heavy duty motor reverses instantly. Mast, tower or platform mounting. Completely weather sealed, factory lubricated for life. Telerotor control with perfect pattern dial gives immediate indication of antenna position.

8 CONDUCTOR LEAD-IN 6c per ft.

TA-3 SUPERSTRUCTURE. Enables use of Telerotor with Ham 10-20 meter Beam Antenna.....$11.97

UNBEATABLE TV RECEPTION
BEST FOR THE FRINGE AREAS

Snyder Lazy XX TV ANTENNA

Complete with three 3½ ft. masts & adj. mounting base

Extremely hi-gain. Superior construction. Designed to withstand all weather conditions. Easily stacked double conical Lazy XX type. Just unfold, tighten and erect. All TV channels and FM. You also get guy wire rings, and connecting stubs. Completely pre-assembled. Can be used with any type lead-in 72 to 300 ohms. Order model TX-2.

$18.39

$6.95

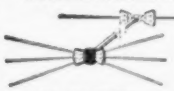
SNYDER HI-LO ANTENNA
with Mast Sections

We don't believe you'll find a finer antenna anywhere near this low price. Two folded dipoles (High and Low) with reflectors. Complete with two 3½ ft. mast sections, guy ring. Ready for easy, quick installation.

TV-21

MODEL AR-21 Exactly same as TV-21. Less Mast and guy ring..... $4.95

Lowest Price Conical Array
CAN BE STACKED FOR FRINGE AREAS
HAS 8 INTERCHANGEABLE ELEMENTS
SNYDER MODEL XA-44—LESS MAST



Complete TV-FM band. Hi-tensile ⅜" aluminum alloy elements. Includes mast clamp for use with poles up to 1¼". Can be used with any type lead-in 72 to 300 ohms.

$4.95

STEEL EXTENSION POLES. Weather treated.
10 ft. long. 1¼" di. $2.19
5 ft. long. 1¼" di. Crimped End..... 1.35
3½ ft. long. 1¼" di. Crimped End..... 1.19

TIE RODS { For Double V Type Antenna..... For Conical Type Antenna..... For Inline Type Antenna..... } 85c ea.

Write for Free "FYI" Bulletin
Address Orders to Dept. R-N-4 or Call Mulberry 2134

WHOLESALE RADIO PARTS CO., Inc.
311 W. Baltimore St.
BALTIMORE 1, MD.

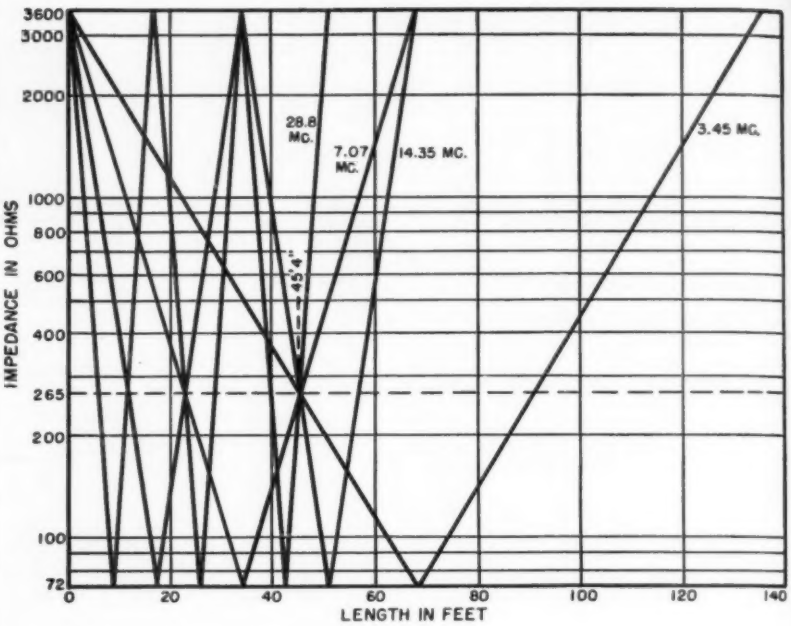


Fig. 2.

have continued the construction to that point and found that the impedance line of the third quarter-wavelength on 10-meters likewise crosses the common impedance point of 265 ohms at 22'8" from the end. Reference to Fig. 1 will serve to clarify our point, the dashed line being our own continuation of Mr. Dreher's plot.

This, then, led us by the same reasoning as that applied by Mr. Dreher to believe that three-band operation was theoretically possible from a single feed point employing 300-ohm non-resonant type line. Mr. Dreher stated that the impedance mismatch from 265 ohms to 300 ohms would not be of appreciable concern. We wholeheartedly agree with him, not only on that basis, but also because tests have shown that the so-called 300-ohm receiving twinlead commonly employed will vary in impedance from approximately 240 ohms to something over 300 ohms.

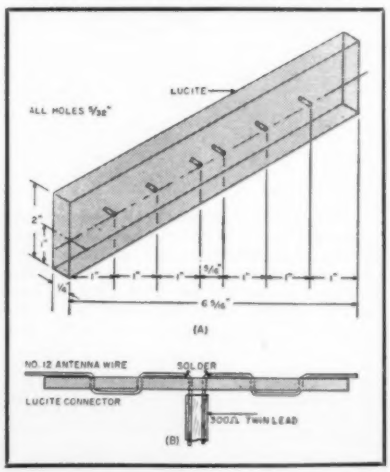
After further consideration of the subject, and still desiring to operate not only on the 40, 20, and 10-meter bands but also on the 75- and 80-meter bands, we selected a suitable length for a radiator on these bands. It is common knowledge that harmonic antennas are not resonant at exact harmonic frequency multiples, due to the end effect and its influence on the outer quarter-wavelength on each end of the wire. We therefore based our final impedance-length diagram on this fact, and selected the flat-top length for resonance at the highest frequency range desired, which was 28.8 mc. (selected for mid-band operation). This highest frequency band was selected because when off-resononce operation on some band is unavoidable a given mismatch in length will be a small percentage of a half-wavelength on the lower frequencies.

With a flat-top length of 136 feet, exact resonance occurs at 28.8 mc., 14.35 mc., 7.07 mc., and at 3.45 mc. Obviously, the worst mismatch is in the length for the 75- and 80-meter bands, but as stated, the mismatch is a relatively small percentage and operation within the 40- and 20-meter bands is possible with only a very small mismatch.

Having established the desired flat-top length, we plotted our impedance-length diagram once more and found our feed point to be located at a distance of 45'4" from one end, as indicated by the diagram of Fig. 2.

On account of our location, we found it impossible to erect the entire flat-top in the clear, so we mounted the feed point on stand-off insulators mounted on the window facing of the second story operating position. Construction of the feedline connecter is exactly like that suggested by Mr.

Fig. 3. Method of lacing wire through connector and attaching 300 ohm line.

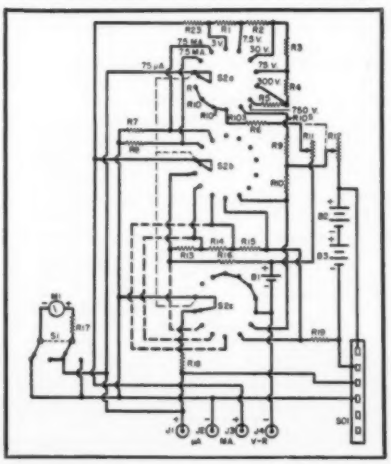


Dreher in his article, and a sketch of this connecter is reprinted in Fig. 3. The over-all length of feedline employed at present is approximately fifteen feet and operation on four bands has proven to be quite satisfactory. A comparison of this antenna with a standard folded dipole made of 300-ohm line was made with several other amateurs and signal reports were equally as good and in most cases 5 db. better.

The "rig" currently being used is a war surplus ART-13, running about 250 watts input to the final. With our four-band antenna and this power input we have had surprisingly good success in working out on the 75-meter phone band even during the congested early evening hours. Our first CQ on the 40-meter band netted us a W6 with a 579X report during the early evening hours. On 20-meter phone we have not had opportunity to test the antenna fully on account of the early closing of the band, but no difficulty was experienced in working an HK1 who was running similar power and using a three-element rotary beam.

As previously pointed out, broadcast interference is held to a minimum due to the absence of vertical radiation from the feeders. A check for standing waves indicates a very low s.w.r., even when working considerably off-resonance as is the case on the 75-meter phone band. All things considered, we are very well pleased with the results obtained and can now operate on all the major bands with a minimum of effort. We strongly recommend this antenna system to those who are, as we, unable to erect more than one antenna. It has given us exceptional results on all 80, 40, 20, and 10 meter ham bands. —30—

In an attempt to simplify the diagram of the v-o-m and grid-dip oscillator appearing on page 46 of the February issue, the ganged switch was shown as having 14 contacts per section. This would be correct in itself if the parts list and text had been altered to correspond with the diagram changes. To avoid any further confusion, we are reprinting the diagram of the v-o-m portion with the correct switch substituted. The dotted lines show the connections which were omitted previously.



BC-223 TRANSMITTER

30 Watt transmitter with Crystal or MO control on four pre-selected channels. CW, MCW cover frequency range 2000-5200 KC. by use of plug-in coils. Complete with tubes and choice of one Tuning Unit (listed below). Less Mtg.—Prices:

USED: **$23.50**

CABLE—Trans. to Power Supply.....**$2.00**
TUNING UNITS: TU-17—2000-3000 KC.; TU-18—3000-4500 KC.; TU-25—3500-5250 KC. **$3.50** EACH
SPARE TUBE KIT in metal box, f/BC-223....**$4.95**
OPERATING MANUAL for BC-223.....**$2.50**
PE-125 POWER SUPPLY f/BC-223—12/24 Volt input; output 500 Volt 150 MA.....NEW: **$11.95**
SPARE VIBRATOR & TUBE KIT f/PE-125..**$4.95**
SHOCK MOUNTING for PE-125.....**$1.50**

BC-375—191 TUNING UNITS:

TUNING UNITS FOR BC-375 OR BC-191 TRANSMITTERS (Listed Below).....**$3.95** EA.

TU-5—1500 to 3000 KC.
TU-6—3000 to 4500 KC.
TU-7—4500 to 6200 KC.
TU-8—6200 to 7700 KC.
TU-9 — 7700 to 10000 KC.
TU-10 —10000 to 12500 KC.
TU-26 — 200 to 500 KC.
BC-306—Antenna Loading

BLOWERS:

115 Volt 60 cycle BLOWER (pictured), approx. 100 CFM Dis. 2¼" intake; 2" outlet. Quiet running. Motor size: 2½"x3¼". NEW—not Gov't surplus.
Order No. RN-520..**$7.99**

DUAL BLOWER—Same as RN-520 above, except has blower assembly on each side of motor. Order No. RN-800.....**$12.95**

L-R #2 Blower Assembly, Plastic Housing 3"x1⅝". Blower Wheel 2"x1"—¼" shaft. (No Motor)....**$1.95**
L-R #2½—Same as above, Housing 3¼"x1½"..**$2.00**
L-R Blower Wheel only, 3"x2"—⅜" shaft....**$1.00**

TRANSFORMERS 110 V. 60 CYCLE PRIMARIES:		WIRE—HEAVY DUTY, RUBBER COVERED:	
SEC.:		2/#16 .....20'	**$1.25**
24 V. ½ amp.	**$1.50**	2/#12 .....10'	**1.00**
24 V. 4½ amps.	**3.95**	1/#6 Shield. 15'	**1.50**
12 V. 4 amps.	**3.95**	1/#6 Shield. 7½'	**.75**
36 V. 4 amps.	**3.95**		

SELSYNS: 115 V. 60 cycle #C78248, 3½" D x 5½" L. New sealed cans. Pair.....**$10.95**

AUTOSYN TRANSMITTER

Autosyn Transmitter for I-81 or I-82 Indicator. Operates from 26 Volt 400 cycle or 12 Volt AC. Removed from new LP-21A Loops. W/calibrated dial and correction pointer.

MC-507: **$6.95** MC-217: **$5.95**

JOHN OSTER MOTOR

Type A-16-B—26 VDC series rev. with reduction gear approx. 100 RPM and limit contacts. Size: 3½" x 1⅝". Slotted shaft at side ¼" x ⅛". Price.....**$5.95**

GUY CABLE

Regular Aircraft Control Cable, 3/32"—7x7—49 Strands galvanized weatherproof, 920 lb. Test. Ideal for television or radio mast guying. Prices:

2¾¢ per Ft.—1000 Ft. or more: 2½¢ per Ft.

WHIP ANTENNA EQUIPMENT

MAST BASES—INSULATED:

MP-48 Base (Illustrated at right) Insulated type with heavy coil spring. Requires 1⅜" mounting hole. Weight: 11 lbs. Price.....**$4.95**

MP-132 Base (Illustrated at left) 1" heavy coil spring. 2" insulator. Overall length: 11½". Weight: 2¾ lbs. Price.....**$3.95**

MP-22 Base—Spring action direction of bracket. 4" x 6" mounting. Price....**$2.95**

MAST SECTIONS FOR ABOVE BASES:

Tubular steel, copper coated, painted, in 3 foot sections, screw-in type. MS-53 can be used to make any length, with MS-52-51-50-49 for taper. Price, each, for any section .....(Ea.) **50c**

MS-54—Larger section than MS-53.....**75c**
BAG BG-56 for carrying 5 Mast Sections.....**50c**

RECEIVER (MOBILE-BOAT-AIRCRAFT)

BENDIX RA-10 RECEIVER—8 Tube Set covering frequency range 150 to 1100 KC. and 2000 to 10000 KC. in four bands by use of remote control unit. Set size: 18⅜" L. x 10¾" W. x 8¾" H. Wt. 32½ lbs. Comes complete with remote control unit, dynamotor, and plugs. BRAND NEW.
Order RA-10 CA f/ 14 Volt DC operation.
Order RA-10 DA f/ 28 Volt DC operation. **$49.95**

3/4 RPM ANTENNA ROTATOR MOTOR

High torque, reversible motor—operates directly from 110 Volt 60 cycle by use of condenser. Light weight, quiet running, ruggedly built, positive stop, easily mounted. Normally operates from 110 Volt 400 cycle. Complete—with instructions. NEW.... **$4.95**

10 MFD 400 Volt Cond., **$1.00.** SPST Momentary Switch, **35c.** DPDT Momentary Switch, **75c.** Realstor, 100 ohm 25 Watt, **50c.** 4 Wire Cable, **5c** per ft.

DYNAMOTORS:

INPUT	OUTPUT:	STOCK No.	PRICE
12 V. DC	220 V. 70 MA.	DM-24	**$6.95**
12 V. DC	220 V. 100 MA.	DM-18	**4.95**
12 or 24 V. DC	440 V. 200 MA. & 220 V. 100 MA.	D-104	**9.95**
12 V. DC	600 V. 300 MA.	BD-86	**7.95**
12 V. DC	330 V. 150 MA.	BD-87	**5.95**
12 V. DC	375 V. 150 MA.	BD-83	**6.95**
12 V. DC	1000 V. 300 MA.	BD-77	**7.95**
PERMANENT MAGNET FIELD DYNAMOTORS:			
12 or 24 V. DC	275 V. 110 MA.	USA/0516	**$3.95**
12 or 24 V. DC or 6 V. DC	500 V. 50 MA. 240 V. 50 MA.	USA/0515	**2.95**

Tell Us Your Dynamotor, Inverter, & Motor Needs!

GEAR TRAIN MOTOR

Ball bearing, low inertia reversible type motor, 588 RPM. Low speed gear 14 RPM. Extra large Gear 7/8 RPM. Operates 26 V. 400 cycle or 12 V. 60 cycle. Price—each—only **$2.95**

GASOLINE ENGINE GENERATOR

HOMELITE Gasoline Engine Generator—30 Volt DC 50 ampere (1500 Watts) generator driven by single cylinder, two cycle air-cooled gas engine approx. 3 HP. Rope or electric starting. From unused Govt. vehicles, reconditioned. Shipping Wt. 150 lbs.
Price..... **$59.50**

SELENIUM RECTIFIER UNITS
HEAVY DUTY—30 VOLT DC OUTPUT:

115/200 V. Three Phase 400 Cycle input:
TYPE 143 w/Transformer & VR 100 amp.....$89.50
TYPE 3FS-5 w/Transformer, VR, & Blower 200 amp..... 99.50
TYPE 52A-11 Rectifier only. Cased 200 amp..... 49.50
TYPE A1 Rectifier only. Cased 200 amp..... 59.50
TYPE RE-60 Rectifier only. Cased 60 amp..... 69.50

AERIAL WIRE:	RG-8/U COAXIAL CABLE (W/PL-259 Plugs, ea. end):	
Aerial Wire Phosphorous Bronze #16 Stranded. 200 lb. test. Weatherproof. 150 Feet on Reel RL-3 w/Clips....**$1.50**	65 Foot length...	**$4.95**
	50 Foot length...	**3.95**
	35 Foot length...	**2.95**

HIGH VOLTAGE POWER SUPPLY

PM Field Dynamotor Supply, 12 or 24 Volt DC input; 500 Volt 50 MA and 275 Volt 110 MA output. Complete with hash filters, separate fuse for each output. Contains two separate dynamotors for the above output; also on and off switch, indicator light, switching relay, receptacles, etc. Heavy gauge metal case, size: 8⅝" x 6¼" x 11½". Used on No. 19 Mark II Radio Set.
Shipping Weight: 62 lbs. Price....Ea. **$7.95**
Metal Case and Punched Front Panel only **$2.00**

GENERATOR: 3/16 HP Generator, 3450 RPM. Shaft size: ½" x 1¼". Output 240 VDC 100 MA and 12.5 VDC 4 amps. Model G-102. Price....**$14.95**

MOTORS:

6 or 12 Volt AC or DC heavy duty reversible motor, approx. 2500 RPM, 1/10th HP. Shaft size: 5/16" x 7/16". Motor size: 2⅜" x 3". Flange mounting. NEW **$3.95**

6 Volt AC-DC Motor—ideal for auto fans, models, etc. Shaft size: ⅛" x ⅜". Used, Tested.....**$1.50**

Address Dept. RN • Minimum Order $2.00 • Prices F.O.B., Lima • 25% Deposit on C.O.D. Orders

FAIR RADIO SALES
132 SOUTH MAIN ST.
LIMA, OHIO

America's Greatest Buy!

Plays 10½" Reels!

Complete, for console installation with single or dual track heads: $345.00

CONCERTONE

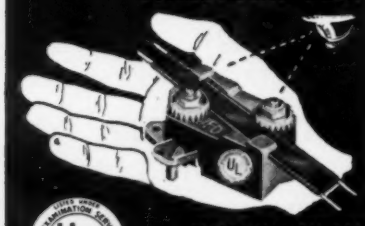
■ The *professional quality* tape recorder you have been waiting for! NAB standards; triodes throughout; 40-15000 cycles at 15", 40-8000 cycles at 7½". Three motors; flutter less than 0.1%; signal-to-noise better than 50 db. Three heads for simultaneous erase, record, playback. Quick change from single to dual track. *Write for booklet.*

FISHER RADIO CORPORATION • *Distributors* • 39 E. 47th St., N. Y.

MAGNETIC RECORDERS CO., 7120 MELROSE AVE., L. A. 46, CALIF.

JFD "Little Giant" TWIN LEAD LIGHTNING ARRESTER

Protects TV Sets Against Lightning and Static Charges



SEEING IS BELIEVING!

ONLY JFD Lightning Arresters offer you these exclusive patented features . . .

1. Patented strain-relief Retaining Lip which prevents pulling or straining against contact points.
2. You actually see positive contact made with lead-in wire.
3. Lead-in contact remains fully visible at all times.
4. No wire stripping. No Arrester Cover to Hide Poor Contacts!

Underwriters Laboratories Approved

No. AT10S

$1.25 List

For Regular Twin Lead

At Your Jobber or Write Direct

JFD MANUFACTURING CO., Inc.

6105-D 16th AVENUE, BROOKLYN 4, N. Y.

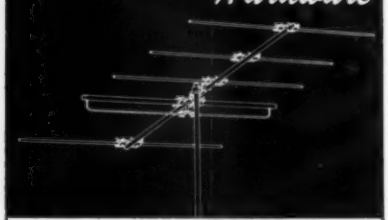
FIRST in Television Antennas and Accessories

Phoenix

·Speed-Tennas

·Speed-Mounts

·Hardware



NEW! SENSATIONAL GAIN

PHOENIX YAGI

- 300-ohm Impedance
- Exclusive Mast Clamp Design
- Quick Rig Installation
- Long-Lasting . . . Trouble-Free

PHOENIX ELECTRONICS INC. LAWRENCE, MASS.

Saturable Reactors

(*Continued from page 42*)

Control Oscillators

The conventional oscillator circuit performs many control and measurement functions in industrial equipment. In the circuit of Fig. 4, for instance, an iron vane brought into the space between the coils will impair feedback and cause the circuit to cease oscillating. When the circuit stops oscillating, no grid current will flow and no bias voltage will be developed across the grid resistor. With no bias, the plate current of the tube will increase and the relay will close. Thus, insertion of the metal vane causes operation of the relay. Some types of elevator leveling controls operate on this principle. If the iron vane is mounted under the elevator platform, and an oscillator is located at each floor level, the relay will operate when the elevator is properly aligned with the floor level. If power to the door-opening mechanism is supplied through this relay, it will be impossible to open the door except when the elevator is correctly leveled.

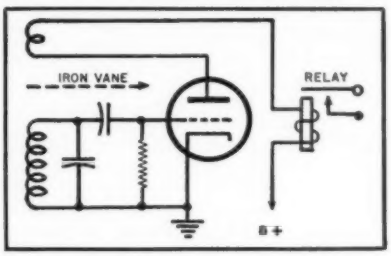
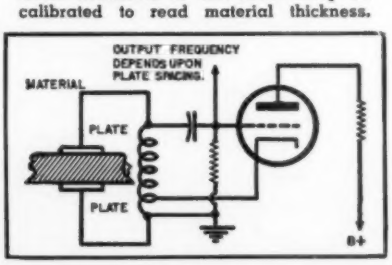


Fig. 4. Control oscillator. When the iron vane is placed between the coils, feedback is impaired and oscillation ceases. When the circuit stops oscillating, its plate current increases and closes relay.

Another variation on this same basic principle involves the control of liquid level in a container. Here, the iron vane is mounted on a float. When the liquid rises or falls to a predetermined level, the vane passes between the oscillator coils and operates the relay. The relay then activates an alarm, indicator, or filling or emptying mechanism.

Sometimes the oscillator coils are

Fig. 5. Use of the oscillator as a thickness gauge. If the thickness of the material increases it forces the plates apart, reducing the tank capacity and raising the oscillator frequency. A frequency meter connected to this circuit may be calibrated to read material thickness.



made physically small and mounted on the face of a meter. When the pointer needle passes between the coils, the relay is energized. This arrangement may be used to prevent a current or voltage from rising above or falling below a predetermined value.

Fig. 5 shows how an oscillator circuit may be used as a thickness gauge or control. The material whose thickness is to be measured is passed between two metal plates. These plates serve also as the condenser of the tank circuit. If the thickness of the material increases, the plates are forced farther apart. The resultant decrease of capacity causes an increase of oscillator frequency. An FM discriminator may be used to detect this increase of frequency, and its output used to control the machine which determines the thickness of the material. In this manner, constant thickness may be maintained. A frequency meter connected to the oscillator may be calibrated to provide a direct reading of material thickness. —30—

CONSTRUCTION HINT

By GENE VINSON

IN constructing an i.f. signal generator I ran across something which may be of interest to other builders.

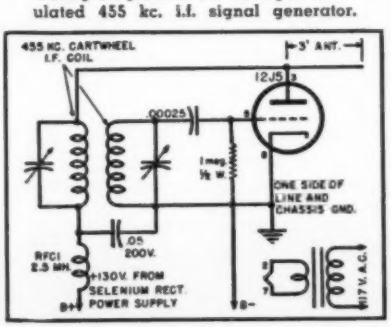
Originally, I intended to modulate the unit with a neon bulb relaxation oscillator but found that I had a lower percentage modulation until I changed the 50,000 ohm oscillator grid leak to a 1 megohm unit. When this was done it was impossible to get 400 cycles from the neon modulator by changing the modulator condenser size.

By disconnecting the neon modulator from the oscillator grid entirely it was found that the oscillator was self-modulated fairly close to 400 cycles. The percentage modulation was higher and the tone was much cleaner. The neon modulator alone had given a rough note.

I believe the 400 cycle modulation is produced by the time constant of the grid leak and grid condenser together with the grid-to-plate capacitance of the tube and/or the difference in frequency of the tuned-grid and tuned-plate circuit, although, with the exception of the tuned-plate, the oscillator is intended to be a series-connected Armstrong.

No connection to the radio is necessary. The three-foot antenna connected directly to the oscillator plate gives fair signal strength. —30—

Wiring diagram of the 400 cycle modulated 455 kc. i.f. signal generator.



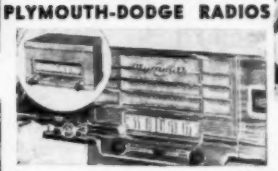
NEW for '51 Automatic Radio CUSTOM-BUILT AUTO RADIOS

RECORD SMASHING VALUES!

1949, 1950 and 1951 FORD AUTO RADIOS

List Price.....$59.95

1949 AND 1950 PLYMOUTH-DODGE RADIOS



List Price.....$59.95

ATTRACTIVE DISCOUNTS TO DEALERS

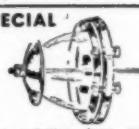
1949, 1950 and 1951 CHEVROLET RADIOS

List Price.....$59.95

CUSTOM-BUILT RADIO
1948-49-50 HUDSON
1951 HENRY J
1949-50-51 STUDEBAKER
List Price $59.95
UNIVERSAL MOUNT
M-90 .....$49.95

Each auto radio is specifically designed to fit all 1949 and 1950 cars shown above and all incorporate the same outstanding features. . . . Six-tube superheterodyne. Six-volt storage battery operation. Two dual-purpose tubes. Eight-tube performance. Installation in a few minutes. Three-gang tuning condenser and tuned R.F. stage for extreme sensitivity. Permanent magnet dynamic speaker with Powerful Alnico #5 magnet. Low battery drain. Weight 10 lbs.

SPECIAL



Navy entering type insulator. Porcelain flanged bowl with brass rod and fittings and aluminum shield. Dimensions: 4¾" high, 6-5/16" O.D. at base.
New $3.95
Spare Bowl 50

CAPACITORS

UPRIGHT MOUNT	EA.	TEN
2X.25 MFD 400 VDC	$ .35	$ .30
.5 MFD 400 VDC	.35	.30
1 MFD 500 VDC	.40	.35
2X.05 MFD 600 VDC	.40	.35
.25 MFD 600 VDC	.40	.35
2X.1 MFD 600 VDC	.45	.40
.1 MFD 600 VDC	.45	.40
.5 MFD 600 VDC	.45	.40
1 MFD 600 VDC	.45	.40
BATH TUB		
40 MFD 25 VDC	$ .40	$ .35
4 MFD 50 VDC	.45	.40
4 MFD 100 VDC	.55	.50
2X.1 MFD 200 VDC	.30	.25
3X.1 MFD 400 VDC	.40	.35
2 MFD 400 VDC	.55	.50
.05 MFD 600 VDC	.35	.30
.25 MFD 600 VDC	.40	.35
.5 MFD 600 VDC	.40	.35
.1 MFD 600 VDC	.40	.35
1 MFD 600 VDC	.50	.45
2 MFD 600 VDC	.65	.60
2X1 MFD 600 VDC	.60	.55
.05 MFD 1000 VDC	.55	.50
2X.1 MFD 1000 VDC	.65	.60
OIL FILLED AND GE PYRANOL		
.5-.5 MFD 400 VDC	$ .65	$ .60
.1 MFD 500 VDC	.55	.50
1 MFD 500 VDC	.70	.65
1 MFD 600 VDC	.85	.80
2 MFD 600 VDC	1.15	1.10
4 MFD 600 VDC	1.60	1.55
5 MFD 600 VDC	1.85	1.80
1-8 MFD 600 VDC	2.75	2.65
.5 MFD 1000 VDC	.95	.90
2 MFD 1000 VDC	1.65	1.60
.5 MFD 2000 VDC	2.00	1.90
.25 MFD 3000 VDC	2.85	2.80
.5 MFD 3000 VDC	2.95	2.90
.1 MFD 7500 VDC	7.50	7.00
1 MFD 7500 VDC	12.50	12.00
.1 MFD 12000 VDC	14.95	14.90
.00088 MFD 15000 VDC	12.50	11.75
.045 MFD 16000 VDC	12.95	12.50
PAPER		
8-8 MFD 600 VDC	$2.25	$2.15
Tobe Filtermite		
3X8 MFD 600 VDC	$2.55	$2.40
8-8-4 MFD 650 VDC	2.45	2.25
160-160 MFD 150 VDC	1.50	1.25
ELECTROLYTICS		
2500 MFD 3 VDC	$ .40	$ .35
500 MFD 12 VDC	.40	.35
25 MFD 25 VDC	.40	.35
50 MFD 25 VDC	.60	.55
1000 MFD 25 VDC	1.25	1.15
150 MFD 50 VDC	.50	.45

TRANSFORMERS

PRIMARIES 115V 60CY

9V@750 MA, 6.3V@3.9A, 5V@6A, 2400 Test.....$3.25
6.6V@6.6A, 2000V Bas 2.60V@1.75A, 2700V Ins.....2.75
6.4V@10A, 6.3@0.6A.....3.45
660/330V@.08A CT 5.0/2.5@3A CT.....3.25
350-0-350@120 MA, 5V@3A, 6.3V 4A CT @.5V.....4.25

SPECIALS

80.86 KC Crystal with Holder.....$2.50
CR-51A Cord Connects BC-65A Transceiver to GN-45 Gen.....1.95
Balloon with Hydrogen Gen.....2.50
Gibson Girl Box Kite.....3.25
17"x17"x36".....2.25
33-440 Mmf Variable Condenser......79
7-100 Mmf Variable Condenser......79
24-750 Mmf Tapered Rotor Plates......90
American Blower and Motor—G.E. ½ HP 115V 1 Phase 60 Cy 1725 RPM. Brand New.....24.95

CHECK THESE VALUES

BC-709 Interphone Amplifier, ideal for aircraft-booster telephone. New.....$ 4.00
MN-26Y Radio Compass Receiver, 150-325KC, 325 - 695KC, 3.4 - 7.0 MCS, 28 volt Bendix. Brand new.....44.50
RA-10DB Receiver, Bendix. New.....39.95
BC-733D Receiver, new, less dynamotor.....14.95
Used w/dynamotor.....6.95
BC-224 Receiver, new, less mtg.....100.00
BC-412 5" Radar Oscilloscope.....59.95
R5/ARN-7 Radio Compass Receiver, w/tubes, used, excel. cond.....39.95
BC-433G Radio Compass Receiver, used, excel. cond. w/tubes.....39.95

TUBES

2C34	$0.85	2029	$0.30
2X2/879	.90	2051	.95
3C24	2.20	7193	.50
7C4/1203A	.85	8011	2.40
10Y	.45	9006	.80
211	.65	C3B	9.75
15R	.85	CEQ72	1.40
30-44	.65	CK-70	4.25
30 Spec.	.55	CRP-72	1.40
45 Spec.	.35	E1148	.30
203A	5.95	HY-615	.75
316A	.75	RKR-72	.75
WL-531	4.95	RK-73	.75
702B	2.50	VT-127A	3.00
717A	1.45	VT-98	21.00
801A	.55	3BP1	3.45
803	4.45	5BP4	9.95
826	.95	5FP7	1.95
931A	5.50	1J6G	.95
864	.45	3A4	.60
860B	23.95	6B6T	1.95
CK1005	.85	6BJ7	1.45
CK1007	1.20	33	.65
1625	.95		

RELAYS

6 VDC DPST Contacts 6A Coil 33 Ohms.....$0.65
12 VDC DPST Allied Control Box 2-32.....1.25
24 VDC 3 PDT 8 Amp......95
24 VDC Solenoid. Operates 2 Switchettes.....1.75
40 VDC DPST—SPDT 1000 Ohm......80
110 VAC DPST 1 Amp Contacts Str'th's Dunn CXA 1972.....3.65
110 VAC DPDT 25 Amp Contacts Ward Leonard.....3.95
115 VAC DPST Str'th's Dunn CXA 2997.....3.65
220 VDC DPDT Str'th's Dunn CX2122.....4.50

Ceramic Rotary Switches

Pole	Position	Section	Shaft	Price
1	3	6	1⅝"	$0.50
2	4	4	1⅝"	.50
2	6	2	2½"	.55
4	10	2	2½"	.55
4	12	4	4"	.55
2	8	30A 9KVA Flash Over		2.50
2 Pole 2 Circuit 6 Cont. W/Knob				.40
DPST Toggle Switch 3A 250V				.35

TRANSMITTING MICA

.065 MFD	1800 VDC	$ 0.65
.006 MFD	2000 VDC	.65
.003 MFD	2000 VDC	.65
.02 MFD	2000 VDC	1.20
.006 MFD	2500 VDC	1.15
.00025 MFD	2500 VDC	2.60
.00075 MFD	5000 VDC	2.75
.002 MFD	5000 VDC	2.95
.004 MFD	6000 VDC	3.50
.007 MFD	5000 VDC	7.50
.0002 MFD	6000 VDC	9.50
.0012 MFD	20,000 VDC	32.50

VALUES

De-Ion Line Starter DPST 115V 60 Cy 15A West. New.....$6.95
Genuine Upright Desk Telephone and Ringing Box, New.....4.95
1 Micro Second Delay Line 15 KVA 400 Cy 50 Ohm. New.....24.95
CO-122 3 Conductor Cable.....

ROUND PANEL METERS

0-5 RF Amps—Westing	3½"	$4.50
0-300 MA DC—Simpson	2½"	3.75
0-300 MA DC—Weshng	2½"	3.75
5-0-5 MA DC—Weston with 50 MA—Shunt	3½"	5.25
0-50 Amps DC—Weston	3½"	5.75
0-100 Amps DC—Hoyt	3"	5.00
0-3 Volts DC—Sun	2½"	3.50
0-15 Volts AC—GE	3½"	4.95
0-2500 Volts DC—Simpson With Multiplier	3½"	5.95
0-5KV DC 0-10 MA DC	3½"	5.50
0-150 Volts DC—Hoyt	3½"	4.50
10-0-+60—Weston	2½"	6.50
PORTABLE METERS		
0-10 Amps DC—Weston	489	9.50
0-3-6-30 Volts DC—Weston	280	19.95
0-100 Amp DC—Weston with 100 Amp—Shunt	269	27.95
0-25 Amps AC—Weston	433	37.50
0-15-6 Volts AC Output-meter—Weston	571	14.95

LINEAR POTENTIOMETERS WW

Ohms	Watts	Mfg'r	Ea.	Ten
200	2	Chicago Tel.	$0.40	$0.35
1000	2	Tretz	.50	.45
3000	2	Chicago Tel.	.55	.50
10,000	2	Chicago Tel.	.55	.50
5000	3	Tretz	.50	.45
7500	3	Tretz	.45	.40
10,000	3	Tretz	.55	.50
25,000	3	Wirt	.65	.60
50,000	4	Tretz	.90	.85
15	25	Dejur	.95	.90
20	25	Ohmite	.95	.90
25	25	Dejur	.95	.90
50	25	Dejur	.95	.90
100	25	IRC	.95	.90
200	25	Dejur	1.20	1.10
500	25	Dejur	1.20	1.10
1000	25	Dejur	1.30	1.25
3000	25	Dejur	1.40	1.35
15,000	25	Dejur	1.70	1.60
20,000	25	Dejur	2.00	1.95
150/Switch	50	AN 3155-50	2.15	2.00
200/W Switch	50	IRC	2.15	2.00
800	50	Ohmite	2.65	2.50
10,000	50	Dejur	2.95	2.75
15	60	Ohmite	2.95	2.75
15	75	IRC	2.95	2.75
750	150	Ohmite	3.95	3.85
20,000	5	Helipot 0.5%	9.50	—
20,000	5	Muter 5% 433AC	8.50	—
5000		Gen.Radio410	1.95	—
6000		Muter 314A	2.25	—

POWER EQUIPMENT

Voltage Regulator Raytheon 95/130 V 60 Cy 1.25 Amp Output 115V 60 Watt. New.$12.50
Generator Voltage Regulator 115V 400 Cy GE GBA-20C. New.....19.95
Vibrapack VP6, 360 12 VDC Output 250V @ 70MA Synchronous Mallory. New.....5.95
ATR Inverter and Regulator 110VDC to 110 VAC 50/60 Cy 150 Watt Model RSB. New.....24.95
VIBRATOR ATR 2410 24 VDC Output 110V 100W. New..2.50

TIME DELAY SWITCHES

1 Minute 115 VAC 60 Cy Enc. in Waterproof Metal Case. New.....$5.25
3 Micro Switches Make Contact at 40-41-42 Sec. Time Delay 110 VAC Motor. New.4.50
Thermo Switch 50° to 300° F. 115 VAC @ 6A, 230 VAC @ 5A Breaks Contact with Increase of Temperature. New.1.35
30-40 Second Mercury Time Delay Relay 110 VAC Adlake. New.....7.50

TERMS: Minimum order $5.00—Mail orders promptly filled—All prices F.O.B. Boston, Mass. Send M.O. or check. Shipping charges sent C.O.D. 25% deposit required with all C.O.D. orders.

Prices Subject to Change without Notice
SEND FOR OUR CATALOGUE
Inquiries from Dealers, Schools and Industrial Firms Invited

COMET ELECTRONIC SALES CO.
22 Washington St. • BEacon 2-7863 • Brighton 35, Mass.

BUILD 15 RADIOS At Home

WITH THE NEW IMPROVED 1951 PROGRESSIVE RADIO "EDU-KIT"

ONLY... $19.95

FREE TOOLS WITH KIT

ABSOLUTELY NO KNOWLEDGE OF RADIO NECESSARY

NO ADDITIONAL PARTS NEEDED

EXCELLENT BACKGROUND FOR TELEVISION

10-DAY MONEY-BACK GUARANTEE

WHAT THE PROGRESSIVE RADIO "EDU-KIT" OFFERS YOU

The Progressive Radio "Edu-Kit" offers you a home study course at a rock bottom price. Our Kit is designed to train Radio Technicians, with the basic facts of Radio Theory and Construction Practice expressed simply and clearly. You will gain a knowledge of basic Radio Principles involved in Radio Reception, Radio Transmission and Audio Amplification.

You will learn how to identify Radio Symbols and Diagrams; how to build radios, using regular radio circuit schematics; how to mount various radio parts; how to wire and solder in a professional manner. You will learn how to operate Receivers, Transmitters, and Audio Amplifiers. You will learn how to service and trouble-shoot radios. In brief, you will receive a basic education in Radio exactly like the kind you would expect to receive in a Radio Course costing several hundreds of dollars.

THE KIT FOR EVERYONE

The Progressive Radio "Edu-Kit" was specifically prepared for any person who has the desire to learn Radio. The Kit has been used successfully by young and old in all parts of the world. It is not necessary that you have even the slightest background in science or radio.

The Progressive Radio "Edu-Kit" is used by many Radio Schools and Clubs in this country and abroad. It is used by the Veterans Administration for Vocational Guidance and Training.

The Progressive Radio "Edu-Kit" requires no instructor. All instructions are included. All parts are individually packaged, and identified by name, photograph and diagram. Every step involved in building these sets is carefully explained. You cannot make a mistake.

PROGRESSIVE TEACHING METHOD

The Progressive Radio "Edu-Kit" comes complete with instructions. These instructions are arranged in a clear, simple and progressive manner. The theory of Radio Transmission, Radio Reception and Audio Amplification is clearly explained. Every part is identified by photograph and diagram; you will learn the function and theory of every part used.

The Progressive Radio "Edu-Kit" uses the principle of "Learn By Doing." Therefore you will build radios to illustrate the principles which you learn. These radios are designed in a modern manner, according to the best principles of present-day educational practice. You begin by building a simple radio. The next set that you build is slightly more advanced. Gradually, in a progressive manner, you will find yourself constructing still more advanced radio sets, and doing work like a professional Radio Technician. Altogether you will build fifteen radios, including Receivers, Amplifiers and Transmitters.

THE PROGRESSIVE RADIO "EDU-KIT" IS COMPLETE

You will receive every part necessary to build 15 different radio sets. This includes tubes, tube sockets, variable condensers, electrolytic condensers, mica condensers, paper condensers, resistors, tie strips, coils, tubing, hardware, etc. Every part that you need is included. In addition, these parts are individually boxed, so that you can easily identify every item.

TROUBLE-SHOOTING LESSONS

Trouble-shooting and servicing lessons are included. You will be taught to recognize and repair troubles. While you are learning in this practical way, you will be able to do many a repair job for your neighbors and friends, and charge fees which will far exceed the cost of the Kit. Here is an opportunity for you to learn radio and have others pay for it.

FREE EXTRAS IN 1951

- ELECTRICAL AND RADIO TESTER
- ELECTRIC SOLDERING IRON
- BOOK ON TELEVISION
- RADIO TROUBLE-SHOOTING GUIDE
- MEMBERSHIP IN RADIO TELEVISION CLUB
- CONSULTATION SERVICE
- QUIZZES

The Progressive Radio "Edu-Kit" is sold with a 10-day money-back guarantee. Order your Progressive Radio "EDU-KIT" Today, or send for further information.

PROGRESSIVE ELECTRONICS CO.

497 UNION AVE.

DEPT. RN-4 BROOKLYN 11, N. Y.

Manufacturers' Literature

Readers are asked to write directly to the manufacturer for the literature. By mentioning RADIO & TELEVISION NEWS, the issue and page, and enclosing the proper amount, when indicated, delay will be prevented.

SUN RADIO CATALOGUE

Sun Radio & Electronics Co., Inc., 122-124 Duane Street, New York 7, New York has just issued a comprehensive catalogue covering items of interest to industry, universities, research laboratories, broadcasting stations, service dealers, engineers, and experimenters.

Designated Catalogue No. 51, this 132-page catalogue contains literally thousands of items in the radio and electronic field. In addition to listing all sorts of component parts, the catalogue contains data on test instruments for servicing and industrial applications, meters, rectifiers, power supplies, inverters, selenium rectifiers, transformers, tubes and tube accessories, racks, cabinets, chassis, connectors, wire, cable, radio hardware, tools, and batteries.

Requests for copies may be made either by mail or by calling in person at the company's headquarters.

NEW INSTRUMENT STANDARD

The American Standards Association of 170 East 45th Street, New York 17, New York has issued its first standard covering portable and laboratory indicating instruments.

Entitled "Electrical Indicating Instruments," the new standard (C39.1-1951) covers both a.c. and d.c. instruments such as ammeters, voltmeters, single phase and polyphase wattmeters, power factor meters, varmeters, and frequency meters.

Charts covering 33 types of panel, switchboard, and portable equipment list rated accuracy, position influence, external temperature influence, sustained operation influence (maximum), external field influence (maximum), and magnetic platform effect (maximum).

The definitions and classification of materials for switchboard and panel instruments have been completely revised as well as extended to include portable and laboratory instruments.

This standard has been developed by a committee representing manufacturers, public utilities, testing laboratories, and government departments under the procedures of the ASA.

Copies of the new standard are $1.60 each.

SELENIUM RECTIFIER DATA

Of particular interest to engineers, *Sarkes Tarzian, Inc.* of 415 North College Avenue, Bloomington, Indiana has recently published a 64-page selenium rectifier handbook which contains practical information on power conversion and suggested applications of selenium rectifiers.

In addition to providing complete information on selenium rectifiers that have found wide use in radio and television receivers, the handbook contains data on power rectifiers for high current application and high voltage enclosed rectifiers for low current applications.

In requesting copies of this handbook, address your letter to the Rectifier Division of the company. The booklet is 25 cents and payment should accompany your request.

TRIAD TRANSFORMERS

Catalogue TR-51 covering the company's complete line of electronic transformers has just been released by *Triad Transformer Manufacturing Co.* of 2254 Sepulveda Blvd., Los Angeles 64, California.

Containing detailed specifications, illustrations, and price information on the electronic transformer line, the catalogue features 35 new items, including a series of transformers developed especially for regulated power supplies, television components, and a complete description of the company's new high fidelity amplifier kit.

Requests for copies of Catalogue TR-51 should be sent direct to the company.

CARRIER AMPLIFIER

A 4-page data sheet describing the company's Type 1-118 carrier amplifier has just been issued by *Consolidated Engineering Corporation* of 300 North Sierra Madre Villa, Pasadena 8, California.

The new bulletin, in addition to describing the applications of this new unit, carries complete specifications, details on the meter and controls, power supply data, information on the oscillator, input and output devices, and lists the special safety features of the instrument.

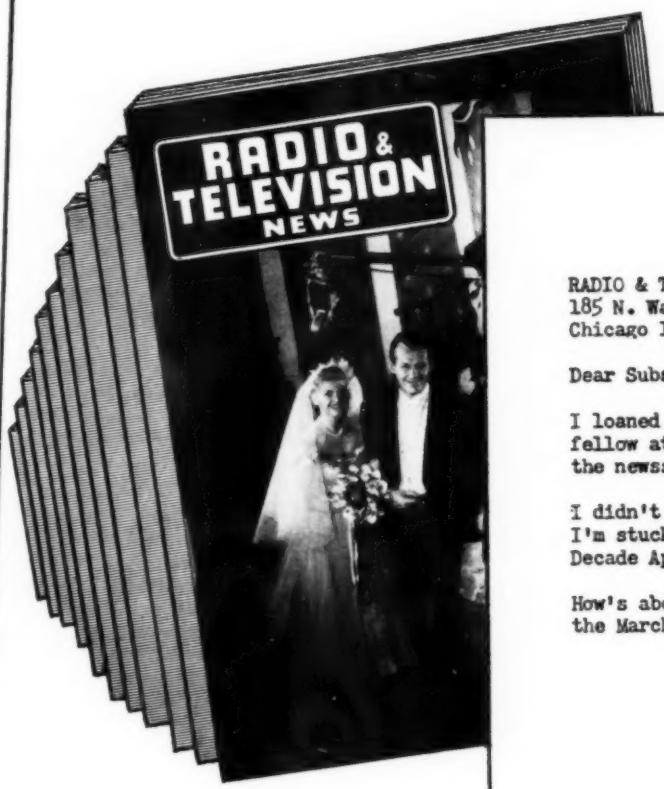
Persons engaged in mechanical-industrial design and development will undoubtedly wish to secure a copy of this publication which is free on request.

RCA SERVICE DATA

Radio Corporation of America, Camden, New Jersey has announced the availability of Volume 5 of the *"RCA Victor* Service Data" book.

This volume which provides service and technical data on all 1949 models of *RCA Victor* television and radio receivers and *Victrola* phonographs is available to service techni-

open letter *From a Subscriber:*



25-14 31st Avenue
Long Island City, N.Y.
March 14, 1951

RADIO & TELEVISION NEWS
185 N. Wabash Ave.
Chicago 1, Ill.

Dear Subscription Mgr.:

I loaned my March subscription copy to a fellow at my shop who couldn't get one at the newsstand.

I didn't get it back, and now it looks like I'm stuck without that article on Resistance Decade Applications.

How's about sending me a duplicate copy of the March issue?

Yours truly,

Ralph K. Davis

Ralph K. Davis

p.s. I've got every copy back to 1941. Find them invaluable reference in my job as chief radio inspector.

A ZIFF-DAVIS PUBLICATION

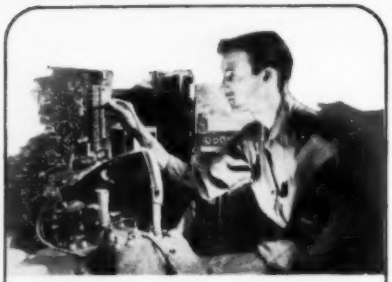
Dear Ralph:

Your duplicate copy has been mailed. By the way, tell that friend of yours he'll be sûre of getting his copies - save money, too, by subscribing to RADIO & TELEVISION NEWS. Tell all your friends about it.

Cordially,

RADIO & TELEVISION NEWS

ZIFF-DAVIS PUBLISHING COMPANY • 185 N. WABASH AVENUE • CHICAGO 1, ILLINOIS
Publishers also of: RADIO-ELECTRONIC ENGINEERING Edition of RADIO & TELEVISION NEWS • POPULAR PHOTOGRAPHY • PHOTOGRAPHY ANNUAL 1951 Edition • MASTERPIECES • FLYING • MODERN BRIDE • FICTION GROUP
ZIFF-DAVIS COMICS



Build Your Career As An

ELECTRICAL ENGINEER

thru this Proven Plan

As a young man with a career to build, you may *today* be interested primarily in training for Radio — and perhaps for TV. But — *who knows . . .* you may some day have both the desire and opportunity to climb further and become an Electrical Engineer! Here, then, is a world-renowned educational *plan* that permits you to use your Radio training as *a major stepping-stone* to an even greater career.

IN 12 MONTHS BECOME A RADIO TECHNICIAN

Train here for radio shop operator or serviceman, mobile receivers and all types of transmitters, and for supervision of service personnel. You may then advance immediately, or at any future date, into courses described below.

IN 6 ADDITIONAL MONTHS you become a Radio-Television Technician

An additional 6-months course gives you intensive TV Technician's training — under the *personal guidance* so necessary in this expanding field.

ALSO...YOUR RADIO COURSE IS FULL CREDIT TOWARD THE B.S. DEGREE IN ELECTRICAL ENGINEERING

The Radio course, while complete in itself, is *one-third* of the college program (major in Electronics). Further — you are guided scientifically toward specialization beyond basic engineering training.

B.S. Degree in 36 months. Military, practical or prior academic training evaluated for advanced credit. Terms open April, July, October, January.

MILWAUKEE SCHOOL of ENGINEERING

Technical Institute • College of Electrical Engineering

FREE—Write for "Occupational Guidance Manual" and 1951 Catalog.

MILWAUKEE SCHOOL OF ENGINEERING
Dept. RN-451, 1020 N. Broadway
Milwaukee, Wis.

Without obligation, mail Occupational Guidance Manual on:

☐ Radio-TV ☐ Electrical Power ☐ Welding
☐ Heating, Refrigeration, Air Conditioning
Also send 1951 Catalog for Electrical Engineering, B.S. degree in ☐ Electric Power ☐ Electronics

Name.....Age.....

Address.....

City.....Zone...State.....

☐ Check if World War II Veteran

cians through the company's distributors.

Designed as a permanent reference volume and bound in hard covers, the book contains the information provided by the single service data booklets issued during 1949 for individual *RCA Victor* instruments.

Essential servicing information covered by the volume includes schematic and wiring diagrams, electrical and mechanical specifications, alignment and adjustment procedures, complete service parts lists, and chassis layouts.

CARTRIDGE REPLACEMENT

Electro-Voice, Inc. of Buchanan, Michigan is currently offering copies of its handy new phono cartridge replacement chart and guide to service technicians and established radio parts distributors.

The chart, which measures 11 by 16½ inches open, can be hung on the wall or folded to 8½ by 11 inches for counter or binder use.

The new publication provides a comprehensive up-to-date replacement listing covering the products of several manufacturers, tells when to replace phono cartridges, how to make the proper tests, and the replacement type unit to use.

The company will send a copy of this chart, No. 161, to those writing direct or copies may be secured from the company's distributors without charge by applying in person.

VIDEO SWEEP GENERATOR

Manufacturers Engineering & Equipment Corp. of Willow Grove, Pennsylvania has recently issued an 8-page booklet covering its "Sweepmaster I," a video sweep generator.

The booklet includes a photograph of the instrument, complete details on the unit's rate and range, operation, applications, and information on mechanical specifications, electrical specifications, tube complement, and, finally, applications of the instrument.

The applications of the unit include the alignment of broadband amplifiers, checking termination of cables, and the location of self-resonant parts.

Copies of the booklet are available without charge when requests are sent direct to the company.

—30—

Carrier Current

(*Continued from page* 41)

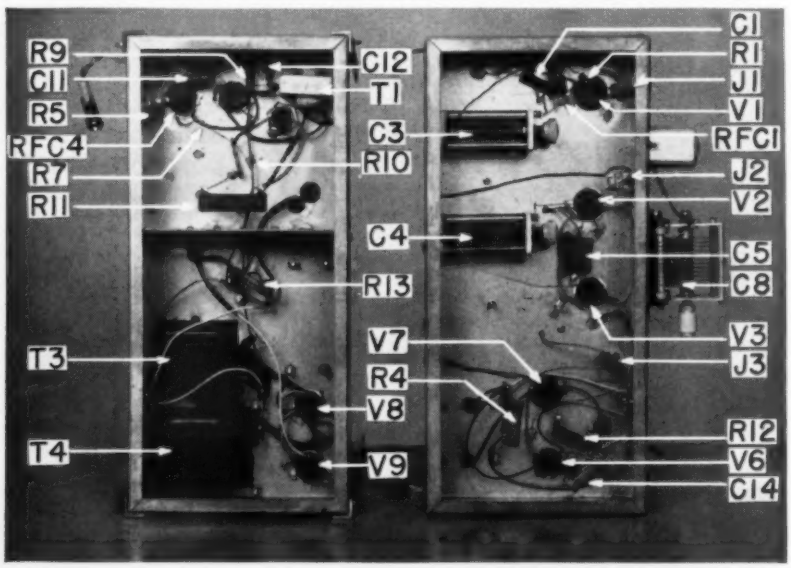
It will be necessary to vary condenser C_4 in the grid tank of the 807's as this varies the reflected load on the 6L6. This is sometimes necessary to get the 6L6 to oscillate. Next insert the meter plug into J_2 and tune C_1 for maximum reading. While doing this make sure that the meter polarity has been reversed for tuning the 807 grid stage. After tuning the grid tank for maximum, it may be necessary to retune the oscillator stage if major changes have been made. Tune the r.f. final last. Of course it is necessary to have the coupling link connected to the 115 volt line or some other form of dummy antenna. Tune the final stage for minimum reading.

After the unit was installed in the private home selected as the transmitter site, the oscillator and grid tanks were tuned. The meter was then left in the plate circuit of the final r.f. stages.

All that is necessary when putting the unit into operation is to turn the unit on, and then tune the final for minimum reading as indicated on the meter. The control for performing this operation is on the outside of the case where it is easily accessible to the operator.

—30—

Layout of power supply and audio chassis (left) and r.f. and modulator chassis (right).



International Short-Wave

(*Continued from page* 106)

nounces next *English* periods for 0700 and 1015 over 15.270, but Pearce has not been able to hear these. Balbi, Calif., reports *Radio Pakistan* on 11.73 with news 1000. Stark, Texas, notes Pakistan on 9.750 to 0815 sign-off, good signal; no location mentioned. Says the 9.645 outlet is barely audible around 0825; still uses 7.140 for news 0700. *Radio Sweden* reports Pakistan heard on 9.490 at 1330 and signing off on that channel at 1415. Staples, England, lists Pakistan as heard on 15.27 with news 0110-0120.

Panama — HP5B, 6.032.5V, heard lately on this channel; measured at 0630; previous measurement was 6.030. (Oskay, N.J.)

Paraguay—ZPA1, 6.275, Asuncion, *Radio Nacional*, heard 1800 with considerable QRM. (McWalter, Scotland)

Peru—OAX4Z, 5.8985V, Lima, heard 0600 almost every morning; previous measurement was 5.894. (Oskay, N.J.)

OAX4J, 9.3342, Lima, heard with weak signal 2135; Latin American music. (Treibel, Washington State)

Philippines — DZH7, 9.73, Manila, heard 0500 with news; was parallel DZH6, 6.03; evidently dropped 15.30 for "local evening" period; the 15.300 channel, however, is heard at weak level 1800-2000. (Balbi, Calif.) *Radio Australia* says the 15.300 frequency is listed 2 kw. and that programs are beamed in a westerly direction.

Dale, Calif., reports DZB2, 3.320, at 0800-0900 sign-off (some days is on the air *after* 0900).

Poland—Warsaw, 6.115, noted recently with news 1300 during its 1245-1315 session. (Pearce, England)

Portugal—Lisbon noted on 9.747 at 1600. (Stark, Texas) Noted in Britain on 11.955 from 1230 sign-on and closing 1430. (Pearce) Heard on 11.955 at 0730, good level in Texas. (Stark)

Lisbon noted on approximately 15.380 signing on with "A Portuguesa" at 0915; heard on 11.955 at the same time but seemed to be carrying a separate program there. (Pearce, England) Lisbon appears to have dropped 11.040 and to be using 9.745 with 11.955 afternoons. (Bellington, N.Y.)

Portuguese Guinea—CQM4 is again using 5.8392 (measured); CMQ7, 6.993, appears to have been discontinued; noted on 5.8392 at 1740. (Oskay, N.J.) Closes 1800 with "A Portuguesa." *No English reported.*

Verified reception on approximately 5.840 but QSL card listed frequency of 7.948. (Pearce, England)

Roumania—A World Radio Handbook Bulletin lists full schedule of the daily short-wave service of *Radio Bucharest* as 0300-0315, 9.250; 0745-0830, 1130-1500, 11.887, 9.250, 6.210; German at 1300-1330; *English* at 1400-1430; French at 1430-1500.

Sao Tome—The 4.807 channel noted 1506 with news in Portuguese; call at 1515. (Pearce, England)

Saudi-Arabia—Djeddah now signs on

Real values on hard-to-obtain items

"S" METER . . . *An outstanding buy!*

Here is a beautiful instrument exactly suited for use as an "S" meter. **Illuminated** face, (supplied with miniature lamp) with a full-scale reading of 5 ma, a standard value for most "S" meter circuits. Diameter across face is 2⅜", black bakelite case, reverse-set pointer. New, surplus . . . limited quantity. Only . . . . . **$1.95** ea.

836 hi-vacuum rectifiers. 2 for $1.50

TRANSFORMERS-CHOKES:

2.5V, 10A. 10KV insulation. Suitable for 866, 836, etc. Reduced to **$3.39** ea.

10H, 200 ma choke. Hermetically-sealed steel case. Also has hum-bucking tap. A beautiful item only **$1.98.**

10H, 50 ma choke. Strap mounting. Handy for dozens of applications. Reg. 98c, reduced to **65c.**

Charger or fil. trans. Pri. 110V, 60 cycle. Secondary, 9-10-11-12-13 volts @ 1.2 A. Fully cased. A buy at **$1.49.**

Vibrator transformer. 6V inp. Secondary 345-0-345 @ 150 ma. Also has bias winding. Fully cased. Bargain at **$1.49** ea.

Power transformer. 780V, CT @ 200 ma. 2.5V at 8a. 5V at 8A. 6.3V at 6A. Pri. 115V, 60cy. AC. Has electrostatic shield. Upright mount. Shipping weight 11 lbs. Only **$5.95.**

Power Transf. 350-0-350 @ 70 ma. 5V @ 3A. 6.3 @ 3A. Pri. 110V, 60 cy, AC. Upright mtg. . . . . **$3.25** ea.

Power transf. Pri. 115V, AC, 60 cy. Sec. 520-0-520 @ 200 ma. . . . . **$5.25** ea.

Power transf. Pri. 115V, 60 cy. AC. Sec. 310-0-310 at 50 ma. Cased, upright mount . . . . . only **$1.95** ea.

Output transf. 50L6 to voice coil . . . . . **79c** ea.

Choke, 6 henry, 200 ma. Strap mtg. . . . . only **$1.95** ea.

HS-16 phones. Used, with headband and 6' cord. A hot buy at **98c**

RCA Hand Mike. Hi-grade, single button. Bronze colored w/cord and plug. NEW. Were $1.98, now reduced to **98c** ea.

TELEPHONE EQUIPMENT:

EE89 Repeaters (see previous ads). Only a few left. NEW! Regularly $9.95 ea. . . now $6.95 ea.

TS-10 Sound powered handsets. A limited quantity only. BRAND NEW! . . . . . **$25.95** pair

Handset hanger. Beautiful cast aluminum shell finished in black wrinkle. Takes all makes and models. An extremely useful, well-made item only **$1.95** ea.

274N/ARC-5 ACCESSORIES

Mounting rack, holds three receivers. Easily modified for single receiver—NEW. . . . only **$1.95** ea.

274N/ARC-5 Spline tuning knobs . . . . . **.59** ea.

Same as above except with deluxe tuning crank . . . . . **.89** ea.

Tuning crank. Fits RU 16-17, BC 433 etc. for manual tuning . . . . . **.89** ea.

LOW FREQUENCY CRYSTALS

Precise units in holders. Ideal for oscillators as markers, BFO, etc. Can also be used as resonators for crystal filters. 450, 453.70, 457.4, 464.81, 466.66, 468.51. Freq. in KC. These are an excellent buy at only . . . . . **89c** ea.

CRYSTAL SETS FOR SSSB FILTERS

Three crystals, 450, 451.85, 453.7 kc. See QST, Nov. 1950, page 11. Set of three. . . . **$2.60** set.

SPECIAL PLUGS & CONNECTORS

R8-ARN8. Two special plugs . . . . . **$1.00** set

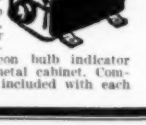
PL-Q103 for BC-348—new . . . . . **75c** ea.

PL-58 fits into EE-8 telephones and many switchboards—new . . . . . **30c** ea.

PL-106 fits RM-14 telephones and others—new . . . . . **45c** ea.

8 pr. Female. Fits SCR-284 equip. . . . . **35c** ea.

CONDENSER TESTER



• One of our best sellers! Useful, versatile laboratory item, in kit form. Simple, and easy to build in less than an hour. Checks condenser leakage and continuity up to 8 megs. Will test any paper, electrolytic, mica or oil capacitor from 50 mmf. to 50 mfd. Self-contained power supply and neon bulb indicator with socket and bezel. Drilled metal cabinet. Complete instructions and diagrams included with each kit. Only **$5.00.**

THE WELL-KNOWN "Q5'er"!

Special purchase on this outstanding unit. Frequency range 190 to 550 kc. 85 kc I.F. Complete with full tube complement.

Used, good condition . . . . . only **$10.95** ea.

R-23-ARC/5. Identical receiver to above except has switch to change from antenna to direction finding loop. Makes a wonderful L.F. direction finder. With tubes.

Used, good condition . . . . . only **$10.95** ea.

SCR-522 Receiver. Used, good condition. Less tubes **$14.85** ea.

0-1000 DC MILLIAMMETER.

Beautiful, full vision 3" round case made by De Jur. Brand new . . . . . only **$2.95** ea.

DOUBLE-POTS

Carbon, small size, two-gang. Made by A-B. One section, 12,000 ohms, one section 22,000 ohms. A buy at . . . . . **$.50** ea.

15 OHM RHEOSTATS

Rated at 25 watts. Ohmite Type "H."
Only **$.50** ea.

SCOPE COMBO OFFER

The makings for an excellent scope. Includes: 1-5NP1 C-R tube, transformer for hi-voltage and fil. for 2X2 rectifier, circuit diagram, only **$7.95**

FL-8 Filters, New . . . . . only 98c ea.

ULTRA-VIOLET LIGHT SOURCE
FOR TELEVISION AND C/R TUBE EXAMINATION

O-R now presents . . . new . . . an 8-watt, ultra-violet, "black-light" source! Here is a highly effective and time saving device for checking burn spots and other defects in phosphors of C/R tubes. C/R tube face fluoresces when exposed to this special black-light to give visual indication of condition of phosphor. Reflected light from C/R tube face is negligible and tube does not have to be in operation. An invaluable device for TV service shops, schools, laboratories. Also used in medical, chemical, foods, stamps, criminology . . . a thousand uses.

In kit form including Sylvania 8 watt, black-light tube, ballast, starter, mounting panel, tube clips, reflector, line cord/plug, hardware, instructions. Simple shadow box for outer housing is easily made.

Complete kit (less outer housing) . . . . only **$4.95**

NEW! PORTABLE GEIGER COUNTER

A small light-weight unit (2 pounds), with a sensitivity that compares favorably with instruments many times its purchase price. Rugged and dependable and intended for professional use. Batteries used provide long life and low replacement cost. Each Geiger counter comes complete ready for use with instructions and radio-active ore sample for comparison tests **$35.00**

TU-10 B TUNING UNITS

The best of the BC-375 tuning units. Has three, transmitting type variables, H.V. micas, RF chokes, Velvet Vernier tuning dials, worm-gear reduction. Really a wonderful source of excellent components . . . . . only **$1.75** ea.

VACUUM TUBE SPECIALS

8012 . . . UHF triode	**$1.50** ea.
WE-717A	**1.00** ea.
WE-316A . . . Trans. doorknob	**.75** ea.
WE-388A . . . Large doorknob	**1.00** ea.
815 . . . twin-beam tet.	**2.50** ea.
6L6 . . . metal	**2.25** ea.
6L6G	**1.95** ea.
6L6GA	**1.95** ea.
1636 . . . VHF converter	**1.00** ea.

LOOK! NO HANDS!

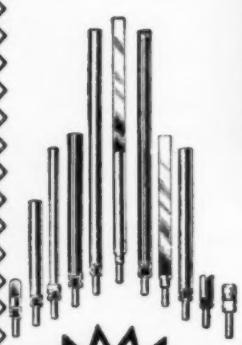
This mike leaves both hands free for mobile QSO's. Fastens to operator by simple snap strap. Adjustable. Double action sw. operates push-to-talk or holds on. BRAND NEW only **$2.00** ea. POSTPAID in U.S.A. and CANADA.

MINIMUM ORDER $2.00. ALL ITEMS SUBJECT TO PRIOR SALE.
ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.
20% DEPOSIT MUST ACCOMPANY ALL ORDERS, BALANCE C.O.D.

OFFENBACH & REIMUS CO.

372 ELLIS ST. SAN FRANCISCO, CALIF. PHONE ORdway 3-8551

PICK YOUR OWN



the "PICK-A-SHAFT" way

★ Pick the right Clarostat AM or AT control for resistance, taper, tap. Then pick the right shaft—choice of 11. Slight rap fastens Pick-A-Shaft to control—squarely, solidly, permanently. It's minimum stock for maximum replacement needs!

★Ask your Clarostat jobber to show you the "Pick-A-Shaft" way. Catalog on request.

CLAROSTAT

Controls and Resistors

CLAROSTAT MFG. CO., INC. • DOVER, NEW HAMPSHIRE • *In Canada:* CANADIAN MARCONI CO., LTD Montreal, P. Q., and branches

The ONLY truly high-fidelity high-performance tape recorder in the popular price field!

Concertone RECORDER

Model 1401

"just like being there"

Has every feature of the most expensive professional equipment. Ready for console installation. Write for Bulletin #102.

$345.00 USER'S NET COST

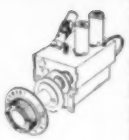
Manufactured By

Berlant Associates

4917 W. Jefferson Boulevard
Los Angeles 16, California

STAR SPECIAL!

New Model DU MONT TELEVISION TUNER



For TV Set Construction and Replacement

New, improved DuMont T3C1 Inputuner. Covers all TV channels plus 88-108 mc FM band. Mechanically and electrically interchangeable with most switch-type tuners and has same mounting holes. Used in Type 630 chassis without alterations. 21.25 mc sound center. Mallory-Ware spiral Inductuner provides high sensitivity and selectivity. Detent selection of TV channels for quick tuning. Complete with tubes (6CB5 and 6J6), knob-dial, mixer plate networks and instructions.
List price $52.50..... **$30.87**

RIDER TUBE SUBSTITUTION GUIDE

Tells you how to beat the tube shortage by proper selection of substitute tubes. Describes and rates for effectiveness all possible substitutions of receiving and television tubes. Tells all necessary circuit changes. An absolute necessity for every TV and radio serviceman.
215 pages, 8¼"x11"..... **$2.40**

SOLA TELE VOLT REGULATORS

Stop TV screen jitters, flicker and distortion due to line voltage fluctuations and overloads. Keeps input to TV set constant even with line variations of 30%! Operates on 95-130 volt AC range. Compact enough to be mounted inside most console cabinets.
Model 7201. 180 VA output capacity.....**$27.60**
Model 7202. 300 VA output capacity..... **30.00**

COMPLETE STOCKS All Standard Brands

Just off the press . . . BIG BARGAIN BULLETIN

STAR ELECTRONIC DISTRIBUTORS, INC.

Dept. RN 4—7736 S. Halsted, Chicago 20, Ill.

its "local evening" beam at 1130; close-down varies; noted as late as 1310 one day, another day closed 1232; noted on channels of 11.950, 11.850, 5.975, 3.950; all-Arabic programs. (Pearce, England) Noted on approximately 5.975 around 2300-2345 (sign-off varies). (Bellington, N.Y.) Should be parallel at that time on 11.75, 11.85, 11.95, and perhaps 9.645.

South Africa — SABC's *"newest"* service is called "The All-Africa Service of the SABC." Schedule is Mon.-Fri. 0330-0700, 0900-1045, 1100-1505; Sat., Sun. 0330-1045, 1100-1515; frequencies are 17.750 *or* 14.230 until 1045, and 11.930 *or* 9.870 from 1100; carries "A" (*English*) programs on Tues., Thurs., Sat., "B" (Afrikaans) programs on other days. (*World Radio Handbook* Bulletin) These broadcasts have been reported as heard by Pearce, England; Bellington, N.Y., others.

Radio Australia says that SABC, Johannesburg, is eager to receive reports from all parts of the world on reception of these transmissions and will acknowledge all *correct* reports by QSL card.

Southern Rhodesia—Salisbury, 3.320, heard with news 1300; good level in Scotland. (McWalter)

Spain—A QSL from *Radio Nacional de Espana*, Madrid, lists frequency as 9.368, power as 40 kw. (Cohn, Ill.) This one now announces during *English* periods as "Spanish National Radio, Madrid." (Pearce, England)

EDV10, listed 7.170, seems to be around 7.180 of late; noted fair to good 1500-1900 sign-off. (Saylor, Va.)

Valladolid, 7.005, noted 1600. (Harris, Mass.)

Radio Nacional de Espana en Malaga now appears to have *English* broadcast on Mondays around 1600-1630; frequency is 7.022; the *English* period normally consists of Spanish songs, folklore, commentary. (Pearce, England)

Alicante, 7.950, noted with strong signal recently 1730-1800. (Sutton, Ohio)

Radio Sweden says *Radio SEU*, Madrid, has moved from 7.190 to 7.160. Ferguson, N.C., gives frequency as 7.160V, heard at 1655.

Madrid noted on measured 15.6257 with music when tuned 1135; closed at 1145 with march. (Ferguson, N.C.)

Spanish Morocco—Radio Tetuan is heard at 0900 over 6.030. (McWalter, Scotland)

Sweden — Stockholm 10.76, heard with strong signal around 1940. (Bellington, N.Y.)

Switzerland—Berne has "Mailbag" on Fridays 0815 over HER5, 11.865; HER6, 15.305, and HER7, 17.784, in *English* beam to Southeast Asia and Japan (this transmission is at 0745-0930); and the "Mailbag" is repeated at 1000 over 11.865 and 17.784 for India and Pakistan (this beam is at 0945-1130). (Grove, Ill.) The 11.865 and 17.784 channels noted parallel at 1145. (Baines, Nova Scotia)

Tahiti—Radio Tahiti, Papeete, at the time this was compiled, was being heard by Balbi, Calif., daily 2300-2345

on 6.140; signal fair. Some U.S. DXers (both East and West Coasts) have heard a station signing on 0200 with "La Marseillaise," using French, on 6.030 or 6.040 that they believe may be *Radio Tahiti*. Has not been reported to me lately as having been heard on former 12.080 or 6.982.

Taiwan—At the time this was written, Taipeh was still using 11.735 and 15.235 at 2300-0100 (first hour in *English*); 15.235 channel seldom heard. (Balbi, Calif.) The 11.735 outlet is noted early mornings but usually is buried by COCY, 11.740, Cuba, by 0715. (Ferguson, N.C.) Still noted on 7.133 with news 0630, by Ferguson.

Tangiers—Radio Africa, near 7.125, noted after 0900. (Pearce, England) *Radio Sweden* lists schedule for this one as 0800-1100, 1400-1900.

Trinidad—VP4RD, 9.625, Port-of-Spain, heard in Scotland 1530 with music. (McWalter)

Turkey—TAS, 7.285, still noted with *English* broadcast 1600-1645; some days runs as late as 1700. (Goodman, Va.) The 9.465 (TAP) outlet parallels.

USI—YDB3, 7.272, Djarkata, noted 1040 with music; signing off 1130. (Russell, Calif.)

USSR—Radio Moscow noted opening in *English* on 15.180 at 0900. (Stark, Texas) This likely is for Asia.

Heard in *English* 0115-0130 on 7.34, 7.32 (announced), 6.11; also noted with *English* in progress at 1635 on 6.133, 6.000. (Bellington, N.Y.)

Moscow noted signing on 0200 on 7.250 with *English* talk to USA. (Sutton, Ohio) Moscow is noted daily on 6.02 with *English* from around 1540 or earlier to 1600 when says will return 1630-1730 on 6.00, 6.09, 7.34, and 1034 kc. m.w. (Bellington, N.Y.)

Current channels announced by *Radio Moscow* for its North American (*English*) daily beam are 15.23, 11.89, 9.69, 7.29, 7.25, 6.01; at 1820-2300. (Fox, D.C., others)

Moscow noted on 9.670 with *English* in progress at 1702. (Harris, Mass.) Heard recently on 11.960 with news 1500-1515. (Sutton, Ohio)

Radio Tashkent, 6.825, has been reported lately around 1100 with talks in *English;* sometimes has severe CWQRM. (*ISWL* Bulletin)

Petropavlosk, 6.07, heard irregularly, some days entirely off the air; usually signs on 0330, off 0400, back 0530. (Balbi, Calif.)

A Russian outlet on 7.180 usually opens at 2200; at times at least is parallel with 5.980; has clock signal for "6 a.m." (Stark, Texas)

Stalinbad, 7.445, noted 0100-0130 in Russian. (Sutton, Ohio)

Vatican—HVJ's 1000 news is announced for the 19-, 25-, and 31-m. bands. Noted recently on approximately 11.660 instead of regular 11.740; announced next *English* period for 1315 on 25.55, 31.10, 50.26 and 196 meters. Continued at 1015 with Polish. (Pearce, England)

Venezuela—YVKX, 3.500, Caracas, noted 2100-2230 sign-off; fine level in Va. (Saylor) YVMQ, 4.940, Baraquisimeto, noted 2110 with music; YVKF,

TERRIFIC VALUES!

TUBES

STANDARD BRANDS ONLY

FULLY GUARANTEED

024A	$1.09	3Q5GT	$1.13	6BE6	$1.85	6S4	$1.15	7C7	$ .93	12SF7	$1.01
1A3	1.05	3S4	.98	6BG6G	2.23	6S8GT	2.80	7E5	1.25	12SH7	1.09
1A6	1.69	3V4	.98	6BH6	1.90	6SA7	1.40	7E6	1.09	12SJ7	.91
1A7GT	1.04	5R4GY	1.49	6BJ6	1.90	6SA7GT	1.40	7E7	1.09	12SJ7GT	.89
1B3GT	1.77	5T4	1.78	6BQ6GT	2.95	6SB7Y	1.29	7F7	1.04	12SK7	1.05
1B5	.95	5U4G	1.25	6C4	1.10	6SC7	1.40	7F8	2.35	12SL7GT	1.05
1C6	.85	5V4G	2.10	6C5	.81	6SD7GT	1.27	7G7	1.29	12SN7GT	2.00
1C7G	.95	5W4	.81	6CB6	1.60	6SF5	.91	7H7	1.89	12Z3	.97
1D7G	.95	5X4G	.89	6CD6G	3.75	6SF7	.97	7J7	1.31	14A7	1.05
1F4	.75	5Y3GT	1.17	6C6	.87	6SG7	1.80	7K7	1.31	14B6	1.05
1F5G	.95	5Z3	.97	6C8G	.97	6SH7	1.24	7L7	1.31	14Q7	1.05
1G4GT	.97	5Z4	1.17	6D6	.87	6SH7GT	1.29	7N7	2.29	14R7	1.27
1G6GT	1.17	6A3	1.37	6D7G	.87	6SJ7	1.59	7Q7	.94	25L6GT	1.00
1J6G	.95	6A4	1.59	6E5	1.09	6SJ7GT	1.59	7R7	1.13	25Z6GT	1.25
1L4	.95	6A6	1.31	6F5	.81	6SK7	1.19	7S7	1.31	30	.88
1LA6	1.39	6A7	1.84	6G6	1.83	6SK7GT	1.19	7T7	1.01	32L7GT	1.67
1LC5	1.39	6A8GT	1.84	6F6G	1.83	6SL7GT	1.19	7V7	1.31	35Y4	.89
1LC6	1.39	6AB7	1.39	6F7	1.37	6SN7GT	1.75	7W7	2.40	35Z5GT	1.45
1LD5	1.39	6AC7	1.70	6F8G	1.47	6SQ7GT	1.25	7Y4	.89	50A5	1.33
1LN5	1.39	6AF6G	1.31	6G6G	.97	6SR7	1.50	7Z4	.93	50B5	1.00
1N5GT	.97	6AG5	1.90	6H6	1.13	6SS7	.89	12A6	.97	50C5	1.02
1P5GT	.97	6AG7	2.97	6J5	.79	6T8	2.70	12A8GT	.99	50L6GT	1.00
1Q5GT	.97	6AH6	3.45	6J5GT	.88	6U5	1.10	12AL5	1.00	56	.83
1R5	1.05	6AK5	2.75	6J6	2.90	6U7G	.89	12AT6	1.40	77	.83
1S4	1.19	6AL5	1.50	6J7	1.70	6V6GT	1.19	12AT7	2.65	2051	.89
1S5	.97	6AQ5	1.45	6J7GT	1.70	6W4GT	1.40	12AU6	1.85	28D7	1.33
1T4	1.04	6AR5	1.40	6J8G	1.39	6W6GT	1.60	12AU7	2.20	VR105	1.49
1T5GT	1.30	6AS5	1.85	6K6GT	.90	6X5GT	1.00	12AV6	1.35	VR150	1.65
1U4	.97	6AS7G	6.50	6K7	.75	6Y6G	1.19	12AV7	3.00	304TL	22.50
1U5	.94	6AT6	1.30	6K7GT	.79	7A4	.97	12AX7	2.40	307A	9.95
1V	.97	6AU5GT	1.75	6K8	1.04	7A5	1.09	12BA6	1.45	703A	3.95
1X2, 1X2A	1.77	6AU6	1.50	6K8GT	1.04	7A6	.89	12BA7	2.00	705A	2.55
2A3	1.27	6AV5GT	1.85	6L5G	.97	7A7	1.59	12BE6	1.55	707B	14.95
2A5	.88	6AV6	1.30	6L6	2.25	7A8	.89	12BH7	2.00	803	5.95
2A6	.88	6AX5GT	1.45	6L6G	1.97	7B4	1.39	12C8	1.34	805	4.95
2A7	.88	6B4G	1.89	6L7	.97	7B5	1.49	12F5	.89	807	1.85
2C44	1.49	6B7	1.35	6L7G	.97	7B6	1.49	12H6	1.65	813	8.95
2E22	1.37	6B8G	1.37	6N7	1.48	7B7	.89	12J7GT	.99	9004	.55
2X2/879	1.31	6BA6	1.60	6N7GT	1.25	7B8	.89	12Q7GT	.89	9006	.55
3A5	1.25	6BA7	1.20	6P5GT	1.23	7C4	.89	12SA7	1.03		
3D6/1299	.68	6BC5	1.90	6Q7	.87	7C5	.88	12SF5	.77		
3Q4	.97	6BD6	1.90	6R7	.97	7C6	1.59	12SF5GT	.79		

WIRE WOUND RESISTORS

5 WATT

	10 or more each	Price each
75 Ohms	$0.19	$0.21
90 Ohms	.19	.21
200 Ohms	.19	.21
5000 Ohms	.20	.22
6000 Ohms	.20	.22

10 WATT

1.5 Ohms	.19	.21
18.5 Ohms	.19	.21
23.1 Ohms	.19	.21
100 Ohms	.20	.22
300 Ohms	.21	.23
450 Ohms	.21	.23
10,000 Ohms	.22	.24
20,000 Ohms	.22	.24

ELECTROLYTIC SPECIALS

40—40—150 V, 100—10 V $0.43

40—20—150 V ..... .39

TOGGLE SWITCHES

DBST—AHH $0.49

SPST—AHH ..... .43

DPST—with leads ..... .45

SPECIAL— 300 OHM WIRE

100-ft. Coil $3.95

1000-ft. Spool 32.50

PM SPEAKERS

ALNICO No. 5

Very Best Quality, NATIONAL BRANDS, Ind. Packed

	10 or more each	Price each
4"	$1.69	$1.75
5"	1.79	1.89
8"	3.25	3.59
10"	5.25	5.49
12"	6.49	6.89

SOCKETS

	Each	Per 100
Molded Octal Sockets	$0.12	$9.95
Molded Loktal Sockets	.10	8.95
Octal Wafer Sockets	.04	3.95

CONTROLS

1 Meg with DPST Switch, 1" Split Knurled Shaft $0.49

100 K with SPST Switch, ¾" Shaft ..... .35

½ Meg with Switch, Long Shaft ..... .54

CERAMIC CONDENSER KIT

100 most popular, assorted sizes $6.95

12 most popular, assorted sizes 1.00

MICA CONDENSER KIT

100 most popular values $7.35

30 assorted values 2.50

OUTPUT TRANSFORMERS

Standard Replacements—for 50L6, 6V6, 25L6, 3Q5, 3Q4, 6K6 ..... ea. $0.49

Minimum order $3.00. 25% deposit on C.O.D. orders.

Prices subject to change without notice.

Availability of merchandise subject to prior sale.

STEVE-EL ELECTRONICS CORP.

Dept. R-4—65 READE ST. NEW YORK 7, N. Y.

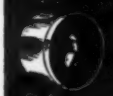
WOrth 4-5575

Watch
MERIT
for TV in '51

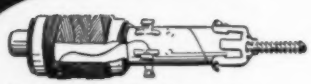
Merit is meeting the rapidly rising demand for TV replacements with a TV line as complete as current and advance information will permit

TRY MERIT FIRST FOR TV CONVERSION OR REPLACEMENT!

HV06—Universal Ferrite core "FLYBACK" permits widest coverage.



MDF70—70° high efficiency Ferrite yoke for tubes up to 19"



MWC-1—Width linearity control with AGC winding (Automatic Gain Control).

FOCUS COILS

Free!
Write today for:

☐ MERIT TV REPL GUIDE AND CATALOG—Dec. 1950 issue. Up-to-date listing of all replacements.

☐ MERIT 1951 CATALOG No. 5111 Shows specs. on complete line of TV, Radio, Amateur and Industrial Transformers.

REFER TO MERIT'S LISTING IN HOWARD SAM'S PHOTOFACTS

TAPE-MARKED TO HELP YOU!
Handy tape marking on every Merit Transformer shows permanent hook-up data for quick reference. ORIGINATED BY MERIT.

MERIT TRANSFORMER CORP.
4427 NORTH CLARK ST., CHICAGO 40, ILL.

4.880, Caracas, heard 2050 with music, clock chimes at 2100. (Russell, Calif.) Incidentally, YVMQ, 4.940, signs off 0017.

YVMU, 3.340, heard after 2000; YVKP, 3.400, Caracas, noted after 2100; YVQE, 3.420, Merida, heard evenings. (Sutton, Ohio) YVKD, 5.062, Caracas, noted 2135 in Washington State. (Treibel)

Yugoslavia—Radio Belgrade, 6.100, heard at 1505 in foreign language; fairly good signal in N.Y. (Bellington)

* * *

Last Minute Tips

An Indian DX-er has informed Graham Hutchins, DX Editor, *Radio Australia*, that Nepal operates on 6.60 and 7.000 and has two programs daily beginning at 0330 and 0915, respectively. The first transmission apparently is of short duration, consisting of news in Nepali. The second transmission includes 0915 national songs and announcements followed by news in Nepali; local news and talk continue to 0940, then a five-minute newscast is given in Hindustani, followed by more national songs to 1003 closedown. A later report from *Radio Australia* says the 7.000 channel has *English* announcement at 0915 sign-on. At the time this was compiled, Nepal had not been reported as picked up in the USA.

CKLO, Canada, appears to be on 9.635 rather than listed 9.630 now.

INEXPENSIVE TV ANTENNAS

By FRANK R. CANNING

LIVING IN A "Garden Apartment" project where outside antennas were frowned upon by the landlord, I was forced to put my TV antenna inside the attic space of the building. While in the process, I wanted to experiment with the effect of various types of beams, but the expense of such a program seemed prohibitive. However, watching my wife wrap up left-over food in some of the household aluminum foil so popular these days gave me an idea! As the antenna would be indoors out of the weather, there was no need of building a strong structure—so why not make it of foil?

Ten minutes later such an antenna was in place and working very well; an antenna consisting of a piece of cardboard and a strip of foil. With all doubts set to rest, work commenced in earnest, and a rapid series of antennas sprouted forth. Some of the types tried are shown in the illustration. All of these were made by pasting sheets of household aluminum foil on large cardboard or plywood sheets, which were either tacked to the roof rafters or suspended by string so they could be rotated.

The four-element yagi was built of narrow wood strips—the kind known as "furring strips." Each element was wrapped with the aluminum foil; in the antenna element a half-inch or so at the center is left uncovered.

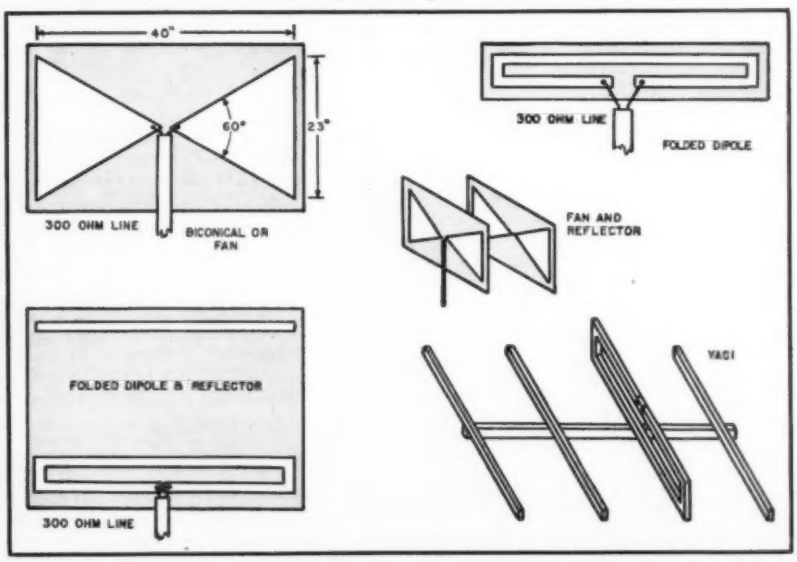
For persons living in fringe areas where a separate high-gain array is needed for each channel, such attic arrays offer a tremendous saving in cost—to put it mildly. A sixty foot roll of foil sells for well under a dollar, and contains enough material for dozens of arrays. Naturally, these antennas won't last a week if erected out-of-doors, but in nearly every case an indoor antenna will function just as well. Also, rain or snow have no chance of changing the antenna characteristics. If the feedline can be run down inside the house walls, its impedance cannot be changed by rain—a common trouble with outside installations.

Last, but not least, this idea will also serve for the amateur operator with lots of antenna ideas but no space in the backyard.

One word of caution: Better buy the wife another roll of foil when you start work—she won't be seeing very much of hers!

—30—

Mechanical details for constructing various types of antennas from aluminum foil.



(Sutton, Ohio; Stark, Texas) CJCX, 6.010, Sydney, Nova Scotia, now has news 1715-1730. (Sutton, Ohio) Also noted here in West Virginia. Hoffman, N.Y., reports CHNX, 6.130, Halifax, Nova Scotia, good signal when checked at 1445 and again at 1835.

Radio Sweden reports that experimental transmissions are being carried out by Nordwestdeutscher Rundfunk from Osterloog, Germany, over a *new* short-wave transmitter on 11.795, output 400 watts; that the Home Service program is relayed on that channel at 0000-1800.

Radio International, 6.11, Tangiers, noted recently at 1530 with commercials, then announcements in French by male announcer. (Bellington, N.Y.)

GDX-aren, Sweden, reports a clandestine station operating in Spanish as *"Aqui Radio Euscadi"* on 6.090 at 0230-0245.

A *World Radio Handbook* Bulletin says CSB56, Portugal, is broadcasting on 6.003 at 0500-0700 on Sun. and 1200-1300 on Tues. and Thurs. (CS2EG, Lisbon, is listed on 6.003 but call may have been changed.—KRB)

Bellington, N.Y., has been hearing an unidentified station on approximately 6.090 with Arabic chanting around 2300-2330. Who?

John J. Oskay, N.J., an *ISW DEPARTMENT* monitor, now has a monthly page in *Short Wave News*, London.

An Arabic speaker heard on approximately 3.96 around 2300-2345 sign-off is believed to be Djeddah, Saudi-Arabia. (Bellington, N.Y.)

Anyone interested in getting International (*English*) Programs reinstated over ZYN7, The Ceara Radio Club, Fortaleza, Ceara, Brazil, should write to Raymond J. G. Staples, "The Listening Post," Quill Hall Farm, Amersham, Bucks., England, who is collecting such requests to forward to the station's officials.

* * *

Press Time Flashes

Stark, Texas, flashes that he has heard *Radio Belize*, British Honduras, on a *new* channel of approximately 4.965 with news at 1925; heard as early as 1835 and leaving the air 1933 with "God Save the King;" probably moved from 10.598.

Cushen, N. Z., reports Taipeh, Taiwan, heard on 3.220 from 0600 with calls BED9 and BED32; on Sat. has *English*-Chinese lesson 0600-0630; clear signal. (Radio Australia)

HRXW, 8.990, Comayaguela, Honduras, noted 2249-2307 with strong signal; all-Spanish. (Patterson, Ga.)

A recent *World Radio Handbook* Bulletin says *Radio Tibet* is operated by Reginald Fox, Lhasa, and is on the air Mon., Wed., Fri. at 1000-1100 on 7.255 in *English*, Chinese, and Tibetan. (*However, the report has never been reliably confirmed to me.*—KRB)

HOLA, 9.505, Panama, noted recently ending *English* session at 2200, asking for reports, then signing off. (Lane, South Dakota)

SIRA, Buenos Aires, has a *new*, at-

SAVE UP TO 95% SENSATIONAL SURPLUS VALUES!

EXPORT INQUIRIES INVITED!
We carry an unusually large stock of Airline Equipment, Test Equipment, Radar Sets, etc. Write for our low prices and complete information. We furnish immediate answers to all inquiries! Write today

ATTN: AIRLINE OPERATORS

APN-9 with MD-149F or PE-206	ARC 5 VHF Set TS-19
T-47A/ART-13	BC-611
DY 17	0-17/ART-13 LFO Unit
TA-2124	0-16/ART-13 LFO Unit
SCR-522A, AM or C	SCR-509
SCR-718C	PP-39/TRC-2
BC-376	AT-49, APR-4
AN ARN-8	SO-7 Parts
APS-4	RC-79A
APS-6	APG-13A Radar
SCR-717	CP-11/APS-15
TBS 3, 4 or 5	R-5A/ARN-7
HS-33	MT-283/ART-13
TS-226A	MT-284/ART-13
IE-56A	BC-348-L New
ARC-4	SCR-729 New
SCR-274 N	Plus many others

MODULATION TRANSFORMER. 50 watts, matches 807's to 2000 ohm RF load. Brand new. $3.49
SCR-522 Used, complete with tubes $49.50
BC-434A RADIO COMPASS CONTROL BOX. Complete with 5 Mil. meter. New $2.95

RS-38 CARBON MICROPHONE. Made by MAGNOVOX. Comes complete with push-to-transmit switch, cord and PL68 plug. $1.25

SPECIALS FOR APRIL ONLY!

ASB-7 EQUIPMENT

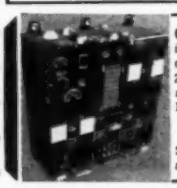
• ASB-7 INDICATOR. Makes a beautiful Scope Foundation Kit. Has 5BP1, 4—6AC7, 3—6H6. Can also be used for remote TV indicator with conversion. Good condition. Orig. $30 $10.75
• ASB-7 RECEIVER. Contains 446 Lighthouse tube amplifier, 955 local oscillator, 955 mixer, 5 stages of I.F. amp., using 5—6AC7 tubes. Uses 2—6AC7 Video Amp, 1—6H6 detector and 1—6J5 tube. Used, good shape. Complete with tubes $17.50
• ASB-7 TRANSMITTER. Contains 2—15E Osc. Tubes, 1—15R Rectifier Tube. Also has blower, relay and post transformer. Complete with coax tuning lines $6.95
• ASB-7 POWER SUPPLY. Supplies 2½ V, 5V, 6½ V, 750V, 2000V, from 800 cycle source. Contains 2x2 rectifier, 5T4 Rectifier Tube, Filter Condensors and 1—6AC7 Tube. Complete with tubes. Xlnt shape $6.95

BC-1072 RADAR TRANSMITTER

Frequency range 157 to 187 megacycles. Comes complete with all tubes, 1½ amp GR Variac. Operates on 110V AC 60 cycles and contains 3½" meter to measure up to 5 K.V. $18.95

TRIPLETT 1183-SC COMBINATION TUBE & MULTI-TESTER. Checks tubes, AF output, measures AC, DC volts, direct current, resistance, cap. Can be used as free-point tester for measurements at tube sockets while radio is on, without removing chassis. 0/10/50/250/500/1000 AC, DC volts. Ohms/volt: 10,000 DC, 2000 A.C. DC MA 0/1/10/50/250. Ohms: 0-500-15,000, 0-1.5 or 15 megs. Used, good cond. Part of 1-56C test set. 14⅛"x7⅞"x4⅜". Weighs 5.2lbs. $49.50

CD-307 EARPHONE EXTENSION CORDS. Used with HS-33 and HS-23 Head Sets. Used 59¢



GO-9 XMITTER. Frequency range 3-18 MC and 300-600 KC. Band switching 100 w output. Brand new in original mfg. crates. Comes complete with tubes and spare parts kit. Comes in three units; high and low frequency xmitter and rectifier. Dimensions: 14" deep x 27" long x 29¼" high. Net wt. 137 lbs. Shpg. wt. approx. 250 lbs. Finished in black crackle, shock mounted. Has 7 meters for indicating plate and grid current, also antenna current. Operates 110V 800 cycles. Single phase and 24V DC. Contains 2—803 tubes, 1—807, 1—801, 2—837, 1—523, 2—1616. Comes with maintenance manual and test data $72.50

EXPORT QUANTITIES AVAILABLE. Write for complete information.

SURPLUS RADIO CONVERSION MANUAL NO. 2 containing conversion information for GO-9 to 10 meters and 110V 60 cycles. Contains 18 other popular conversions and complete information $2.50

274-N AND ARC-5 EQUIPMENT

RECEIVERS

3-6 MC. Used. Originally $30, NOW $5.95
6-9-1 MC. Used $7.95

TRANSMITTERS

T-22 ARC-5, 7-9 Megs. Used $10.95
T-23/ARC-5 100-156 Megs. 4 channel Xtal, used $25.00
MD7-ARC5 Modulator Plate and Screen for T23ARC5, with Dynamotor $15.00
T-21 ARC-5,3-7 MC. New. Orig. $40. Now $8.95
4-5.3 MC. Used. Orig. $30.00. Now $5.95
2.1-3 MC. LN. Orig. $40. Now $16.95

BC-924 FM XMITTER. Frequency range 27-39 MC. 35 Watts output. 4-channels, tunable throughout entire range. Complete with tubes and dynamotor. Specially priced at just $19.95

TBY VIBROPACK for TBY Transceiver. Supplies all voltages. Operates on 4 volt source. Brand new. $12.50
VACUUM CONDENSERS. 50 MMFD 5 amps. 5 KV $1.25

PORTABLE F.M. XMITTERS & RCVRS!

These operate on 6V DC, 34 MC varied either direction depending xtals, xmtr and Recvr has aluminum case with antenna relay. Xmtr uses 1073.125 KC extral in osc. stage followed by 4 doubles and 1 fin. amp. all using HY 65 tubes. Mike amp. and Fre. Mod. use 1C7G tubes. Xmtr stages have metering jacks. Rcvr is superhet. Xtal cont. local osc at 8060 KC. Power Supply on chassis using Carter 6V gen. output 450 V 250 ma 6V vibrator power supply for receiver. All tubes inst. heating. Included is control box, hand set, 8" speaker and extra microphone. Used, complete set priced at only $45.00

IMPORTANT
NO ORDER LESS THAN $5.00. Send 30% deposit on cost of item or full amount to save C.O.D. charges. Do not send shipping costs. It will be C.O.D. only. Shipments sent via Railway Express unless other instructions given. Merchandise subject to prior sale. Prices subject to change at any time.

NEW STANDARD BRAND CHOKES

SWINGING CHOKES

HY	BRAND	MILS	OHMS	PRICE	VOLTAGE	CASE	WT.
8-40	Stancor	175	100	2.75	3KV	Closed	3.5
8-30	Stancor	200	80	3.25	3KV	Closed	4.5
5-25	UTC	200	100	4.95	2KV	Closed	5
5-25	UTC	300	90	9.95	5KV	Closed	18
8-25	Stancor	300	80	5.95	5KV	Open	8½
5-25	Stancor	300	80	4.95	3KV	Open	4
5-25	UTC	500	60	12.95	7KV	Closed	28
8-40	UTC	1 amp	50	39.95	10KV	Closed	58

SMOOTHING CHOKES

HY	BRAND	MILS	OHMS	PRICE	VOLTAGE	CASE	WT.
5	GTC	500	600	4.95	2KV	Closed	4
7	Stancor	150	200	1.25	2KV	Open	2
10	UTC	500	60	12.95	7KV	Closed	28
12	Stancor	300	80	5.95	5KV	Closed	9
12	Thordarson	375	105	3.95	5KV	Closed	8
12	Thordarson	400	400	6.95	2KV	Closed	15
15	Stancor	200	120	2.95	3KV	Open	4.5 lbs.
20	Stancor	350	80	4.95	3KV	Closed	9 lbs.
20	UTC	300	90	4.50	4KV	Closed	10 lbs.
20	UTC	400	85	5.95	5KV	Closed	14 lbs.

SMOOTHING CHOKES WITH HUM BUCKING TAP

HY	BRAND	MILS	OHMS	PRICE	VOLTAGE	CASE	WT.
20 Series	UTC	1A	50	39.50	10K	Closed	80
5 Parallel	UTC	2A	12.5				
16 Series	UTC	175	96	5.95	2.5K	Closed	15
4 Parallel	UTC	350	24				
26 Series	UTC	200	112	6.95	3.5K	Closed	15
6.25 Parallel	UTC	400	28				

VARIAC, GR. 0-130 volts, AC 60 cycles, 5 amps. 7½ A intermittent. Brand new and specially priced at just $16.95

GENERAL ELECTRIC VOLT METER 0 to 150 Volts, AC, 60 cycles. 3½" diameter. Brand new. Specially priced at just $4.95
ARC-4 VHF TRANSCEIVER. 140 to 144 Megs. Comes complete with tubes, dynamotors and crystals $35.00

BC-347 INTERPHONE AMPLIFIER. Contains 6F8 Dual Triode and matching transformer. Brand new $1.49

BC-611 HANDIE-TALKIE. Part of SCR-536. Frequency 3.5-6 MC. Attention Construction men, builders, surveyors. Perfect for short distance communication. Weighs only 5½ lbs., hand-held like a hand set. Pre-set to your frequency. Push-button controlled. Transmitter and receiver in same case 15¼" x 3½" x 5½" sturdy aluminum case. Comes complete with tubes, crystals, one set batteries. Extra batteries available. Models B, C, D, E, F, available. PRICE ON REQUEST!

V&H RADIO & ELECTRONICS SUPPLY
DEPT. R-20, 2033-37 W. VENICE BLVD.
LOS ANGELES 6, CALIFORNIA

Read RADIO & TELEVISION NEWS Every Month

Specialized Service Men
CRYSTALS FOR LESS! If you are servicing aircraft, marine, police, mobile or industrial radio you may be entitled to our SPECIAL DISCOUNT on highest quality quartz control units. Write for full details . . . it will mean money to you!
RADIO SPECIALTY MFG CO. Dept. RT
2023 S.E. Sixth Ave. Portland 14, Oregon

read about "Experiments in Audio"
you'll find it in PF INDEX
FREE GET YOUR COPY FROM YOUR PARTS JOBBER

INVENTORY SALE
ALL PRICES CUT TO BONE

Don't Buy Tubes until you get our prices. Quantities Limited. Prices Subject to Change Without Notice. Low Prices.

TELEVISION TUBES

6CD6—$2.75, 6BG6—$1.95, 6CB6—$1.75, 6S4—$1.40, 6AK5—$1.90, 6AQ5—$1.75, 6BA7—$2.00, 12AT7—$2.25, 6BQ6—$2.50, 6AU6—$1.75, 1L4—$1.40, 1U5—$1.26, 1U4—$1.40, 3V4—$1.40, 6V6—$1.40, 6W4—$1.26, 6T8—$2.03, 6AL5—$1.40, 6BA6—$1.26, 12AX7—$1.68, 19BG6—$4.20, 6X4—$1.15, 6AV6—$1.15, 6BH6—$1.50, 6BE6—$1.40, 12AU7—$2.20, 12BE6—$1.35, 25L6—$1.35, 1T4—$1.40, 50C5—$1.65, 3S4—$1.40

All Other Types at Vast Reductions

Westinghouse Cuprox Rectifier 0.64 Amp. 28 Volts. Reg. $11.00 ea. Special.....$1.95
TUBE SALE—2 2A7-55-27-85-31-56-57, 80 Mixed Ass't. 6 Each Type.....2.25
12 BRAND NEW 10" PHONO RECORDS—Ass't. Jazz—Hillbilly—Popular. Please specify.....$1.79
3 Ft. 5 Wire Shielded Cable with Amphenol Connection.....8 for $1.00
Signal Corps Phones—2 M. Ohms (8 M. Ohms Imp.).....$1.00
2 Ft. Ext. Cord (and Plug).....40c
2 MFD—1000 V Upright Bottom Lug.....89c

TOBE TUBULAR ELECTROLYTICS

20-20 MFD. 150 V...40c 30-30 MFD. 150 V...57c
40-40 MFD. 150 V...59c

Low-Loss Short Wave Lock Type Air Trimmer Variable Condensers

3 Pf.—12-15 Mmfd..12c
7 Pf.—25-30 Mmfd..15c
8 Pf.—30-35 Mmfd..16c
14 Pf.—56 Mmfd....24c
27 Pf.—100-110 Mmfd 35c

3 GANG T.R.F. VARIABLE CONDENSERS .000365 Con. 65c

D.P.D.T. SLIDE TOGGLE SWITCH....15c

4 PR. WAFER SOCKETS—$1.49 per C. each.....3c
5-6 PRONG WAFER SOCKETS.....$2.50 per C
100 ASST. SOCKETS—4-5-6-7.....$3.50 per C
1,000 OHM WIRE WOUND POTENTIOMETER.....15c
30 HY-FILTER CHOKE SHIELDED.....3 for $1.25
UNSHIELDED.....3 for 1.00
2,000 ohm Wire Wound Rheostats.....$1 per doz.
CARTER WIRE WOUND C.T. VARIABLE 20 OHM RESISTORS.....85c per doz.
GEN. ELEC., WESTINGHOUSE, etc., 60 CYCLE WATT HOUR METERS, slightly used, perfect condition, same as used in your home. 110-125 volts. 5 Amps, $3.95; 10 Amps.....$4.95

PIEZO CRYSTAL HOLDERS.
12 for $1.00—$6.00 per hundred—$50.00 per 1,000
RCA Band Switches—
3 gang, 3 pos. 3 band.30c 6 gang, 4 pos, 4-5 band.40c
Trimmer-Padder Asst.—all isolantite—singles, dual; triples—100 asst. pieces.....$2.25
Philco push button Rotary Switch Double Pole....35c
ATTENTION: Prospectors, Explorers for Hidden Treasures! Construct a U.S. Army Type of Metallic Mine Detector Amplifier. Amplifier unit only (less tubes and batteries) with cables, headphone cord, and jack. Army wiring diagram. Type AN/PRS-1.....$1.95
RCA Ass't Mica By-Pass Cond. .001, .0025.
100 for.....95c
8 or 9 Gang Push Button Switch.....49c
DRILLED CHASSIS FOR 5-6 tubes 5"x10"x1½".....25c
PHONE JACKS—OPEN & CLOSED AUTO.....18c
NATIONAL 20 MFD—450 VOLT CAN FILTER CONDENSER.....25c
EBY SPEAKER VOL. CONTROL—50 OHMS.....15c
SALE—PHONO RECORD ALBUMS—12"—3 comp. 15c; 10"—3 comp.—15c; 4 comp. 20c; 12 comp.—89c
IRC—300 Watt—300,000 OHM Wire Wound Res. 95c
6 Prong Amphenol Sockets.....$4.00 per C
AMERTRAN FILAMENT TRANSFORMER—6.3 V., 1 Amp. Encased Isolantite Terminal Posts....$1.50
AMERTRAN XMITTING AUDIO XFORMER—For Class B or Modulator. Pri. 6400/1600—Sec. 5560 @ 160 MA. Cost $75.00.....SPECIAL $2.49
AMERTRAN AUDIO OUTPUT XFORMER—Pri. 10,000 @ 15 MA: Sec. 300, 6-1 Ratio.....$1.49
AMERTRAN MIXER AUDIO XFORMER—Pri. 600-10,000 Ohms.....$1.00
156-1 RATIO VERNIER DIALS—4 in., ¾ in. Hub.35c
LINE VOLTAGE NOISE ELIMINATOR—Plugs in Between Radio and Elec. Socket.....35c
12 in. MAGNAVOX SPEAKER, 2500 Ohms.....$2.95
HEARING AID CORDS—Assortment of 12 for....$1.00
BY-PASS COND. ASST.—25 Cans, Bake., Paper, etc.....$1.00

MINIMUM ORDER $3.00—NO C.O.D.
SHIPMENTS—PLEASE INCLUDE POSTAGE

NEWARK SURPLUS MATERIALS CO.
Dept. AP
324 Plane Street **NEWARK 1, N. J.**

tractive QSL card that is 5¾ inches by 8¾ inches. It lists LRA, 100 kw., in the 49-, 31-, 25-, 19-, and 16-m. bands; LRA, 9.455, 50 kw.; LRA, 11.880, 50 kw., and LRA, 15.290, 20 kw. HJEX, 6.054, 2.5 kw., Radio Pacifico, Apartado Nacional 559, Cali, Colombia, has an odd-size QSL card, 4 inches by 8¾ inches; schedule is 0630-2230. HJKD, 6.000, 10 kw., Radio Emisora Nuevo Mundo, Bogota, Colombia, has a nice card; schedule is 0800-2300. (McPhadden, Calif.)

A letter from 4VEH, Haiti, says the technician of the station is concentrating on getting a 10 kw. transmitter built before the materials get scarce; expects to retain present frequency; at press time the QSL cards were not yet ready for posting. (Herd, Dela.)

Radio Jamaica, Kingston, sent schedule of 0630-0900, 1200-1400 on 4.950; 1600-2300 on 3.360. Said "frequency of 3.480 was used in the days when this station was operated by the Government. Since July of last year, Radio Jamaica has been operated as a commercial station by the Jamaica Broadcasting Company, Ltd." An earlier verification listed power as 5 kw. and stated that the antennas were designed for 100 per-cent vertical incidence. (Lucas, N. Y.)

Port-au-Prince, Haiti, has been noted by Ferguson, N. C., on measured 8.990 around 1600-1900 sign-off.

Harris, Mass., Stark, Texas., others, report *Radio Martinique*, 9.700, Fort-de-France, can be heard from around 1730 (when a U. S. station leaves this channel) to around 1830. So far, all-French programs are noted.

Schedules from *Radio Warsaw*, Poland, list *English* sessions for 1200-1230 on 9.527; 1245-1315 on 11.740; 1350-1420 on 9.527, and 1630-1700 on 7.205; on Saturdays has a "Request Program" when the station answers listeners' requests for music and acknowledges reception reports; says programs for North America are transmitted on 9.570 at 1930-2000, 2300-2330, 0015-0100. (Fox, D. C.)

Moscow, 7.342, noted with news when tuned 0115; at 0130 said would be back at 0200. (Ferguson, N. C.)

OIX2, 9.555, Helsinki, Finland, heard 2200 with news for North America; at 2210 continues in language. (Ferguson, N. C.)

A *new* one is XECC, 15.205, Mexico City, noted around 1910 to 2120 when signal fades out; seems to relay XEMC and at 1945 announces "for a string of 'XE' outlets." (Ferguson, N. C.)

Rio de Janeiro, 15.3638, heard from around 1830 to after 1930 with native music; excellent level in Calif. (Russell)

Peking, 10.260, noted very weak signing on in Chinese 1800. (Leary, Indiana)

Prague sent North American schedules as 1900-2000, 9.550; 2100-2200, 9.55, 11.84; 2230-2300, 9.550, 11.840; first half-hour of first two transmissions is in *English* and third period is entirely *English*. (Garcia, N. J.)

XEBT, 9.625, Mexico City, noted

$$$$$$$$$$$$$$$$$$

WE PAY CASH
for all types of
RADIO, RADAR, ELECTRONICS OR GOV'T. SURPLUS EQUIPMENT

Regardless of condition. Top dollars for:

- ART-13
- DY-17
- TS-12
- TS-13
- I-100
- BC-348 (AC or 28 V)
- BC-788C
- I-152C
- Signal Generators
- Microvolters
- Lab. Test Equipment

Plus anything and everything you have in Electronics Equipment. Send description and asking price to:

WEST REGION ELECTRONICS
Dept. V, 1437 S. Norton Ave., Los Angeles 19, Calif.

WANTED
- **PE-237 POWER SUPPLY**
- **GN-58 GENERATOR**
- **1306 TRANSMITTER RECEIVER**

BEST PRICES—NO QUANTITY TOO BIG, NONE TOO SMALL.

WRITE TODAY GIVING DETAILS TO— **Box 513**
c/o RADIO & TELEVISION NEWS
366 Madison Ave. **New York 17, N. Y.**

SILVER SOLDER TORCH & KIT $6

Joins All Metals Permanently
Equal to Welding for Most Purposes

Do your own repairing. KIT includes one tube silver solder flux and 10 5-in. lengths silver solder alloy. Hottest ALCOHOL TORCH known. 2700° F. flame. Operates in any position, indoors or out. **Torch alone $5. Kit alone $1.50.** Complete instructions included with torch and kit. Add 25c on each order towards shipping charges.

AMERICAN PRODUCTS CORPORATION **DEPT. 12-D**
422 S. Dearborn St. **Chicago 5, Illinois**

Advance with ELECTRONICS ICITY

You need firm grasp of fundamentals to keep pace with these complex, fast-growing fields. In thorough 2-year course learn electricity, electronics, physics, mathematics, drafting, etc. Employers *want* Franklin graduates. Coed. G.I. approved. Day, evening. 43rd year. *Write for Catalog.*

FRANKLIN TECHNICAL INSTITUTE
46 Berkeley Street **Boston 16, Mass.**

EVERY RADIOMAN Can Use These SERVICE HINTS!

Valuable Manual Yours—FREE!

Every page of "How to Simplify Radio Repairs" is packed with on-the-bench, practical ideas. Contains photos, charts, diagrams—no fluff—no vague theory. In plain every-day language it gives you priceless suggestions—new servicing ideas. You'll use and benefit from the experience of experts. Partial list of contents: How to Localize Trouble; How to Service Amplifiers; How to Test for Distortion; How to Test Audio Circuits; How to Test Speakers; How to Find Faults in Oscillators; How to Test Radio Parts—and it's all yours—**FREE!** No obligation.

FEILER

SEND COUPON OR PENNY POSTCARD FOR YOUR FREE COPY TODAY!

FEILER ENGINEERING CO., Dept. 4H1
1601 S. Federal St., Chicago 16, Illinois
Please RUSH my FREE copy of "How to Simplify Radio Repairs."
Name .....
Address .....
City..... Zone.... State.....

weekdays around 2000-0100. (Boggs, Mo.)

HI4T, 5.98, HI2T, 9.735, noted recently with news and *English* talk at 2200. (Balbi, Calif.) Lately these Dominican Republic outlets have run to 2300 or later. (Stark, Texas)

FK8AA, 6.035, Noumea, New Caledonia, is still noted from 0200 to around 0530 sign-off; opens and closes with "La Marseillaise;" all-French programs. (Balbi, Calif.)

At press time, many DX-ers—from New York to Texas—were reporting reception of Monrovia, 6.025, Liberia, late afternoons to approximately 1845 sign-off.

Tips from Peddle, Newfoundland, include—Scutari, 8.170, Albania, 1445-1515. Nova Lisboa, 11.925, Angola, noted 1415-1545. ZEAF, Salisbury, Southern Rhodesia, sent schedule for 3.320 weekdays at 1055-1500, Sundays from 1300; 7.280 weekdays 0400-0615, Suns. from 0330; 9.490 weekdays 0400-0615, 1055-1500, Suns. 0330-0615, 1300-1500; was using 200 watts on 9.490 and 7.5 kw. on 3.320 when Peddle heard them; gave QRA of Office of the Chief Engineer, Dept. of Posts and Telegraphs, P.O. Box 37, Causeway, Southern Rhodesia. OTH, 9.210, Leopoldville, Belgian Congo, noted 1230-1330. OSK, 10.725, Brussels, heard with identification at 1430. OLR3B, 9.504, Prague, noted 1315-1330. HI2L, 3.290, Dominican Republic, heard 1900-2130. TY04, 9.115, Paris, noted with identification at 1600. Rome, 3.960, noted 1400-1730 parallel 6.250; heard on 9.570 in *English* 1415-1430; and in *English* 0600-0630 on 21.580, 17.750, 15.120, 11.810. Belgrade, 15.230, Yugoslavia, noted recently directed to BBC, London, at 1030-1045. CR5SB, 17.677, Sao Tome, noted Sundays 0700-0800, off with "A Portuguesa." TGWB, 6.440, Guatemala, noted with *English* announcement around 1955.

Finally, from Rio de Janeiro, Serrano sends these flashes—*Radio Tamandare* is a *new* station in Recife, Pernambuco, owned by "Emissoras Associadas," Brazil's greatest radio network; has been testing on 3.265 with 1 kw. and on m.w. with 20 kw. *Radio Arapuan*, Brazil, may have a s.w. outlet in the tropical band soon. La Paz, approximately 9.500, Bolivia, is heard at 1900. *New* is CE1515, 15.15, Santiago, Chile, *"Radio Corporacion;"* every half hour announces in Spanish, after gongs, and sometimes asks for reports; heard from 1100 to after 1800; signal poor to good; announces stations as CB114, m.w., clear channel of 1140 kc., 50 kw.; CE619, 6.19, 49-m. band; and CE1515, 15.15, 19-m. band. (The latter is also reported by Ferguson, N. C., as late as 2220.

* * *

Acknowledgment

My thanks, fellows, for the splendid reports during the winter months. Please keep them coming in spring and summer to Kenneth R. Boord, Short-Wave Editor, 948 Stewartstown Road, Morgantown, West Virginia, USA. . . . . KRB

THE NEW TURNER

Aristocrat

MODEL 50D DYNAMIC
FOR TV - AM - FM
Recording • Broadcast
Public Address

SPECIFICATIONS

FREQUENCY RESPONSE: 50 to 15,000 c.p.s. flat within ±2½ db.
OUTPUT LEVEL: 56 db below 1 volt/dyne/sq. cm.
IMPEDANCE: 15, 200, 500 ohms or high impedance.
POLAR PATTERN: Essentially non-directional in any position.
MOUNTING: Ball and swivel type, tilts in any direction. Standard ⅝" — 27 thread.
CABLE: 20 ft., high quality rubber covered, two conductor shielded cable with Cannon quick-disconnect plug.

★ The crown jewel of dynamic microphones. See it, handle it — use it on highest quality recording, public address or broadcast work. New beauty, new styling, new utility and new performance make the Turner Aristocrat the finest of the fine. Use it anywhere, indoors or out — in hand, on stand, suspended, or concealed in stage settings. The Aristocrat is quickly and easily detached from ball swivel coupler for hand use. Non-directional polar pattern picks up sound from any direction. Equally effective for individual or group pickups with wide range, high fidelity reproduction of voice or music. Its high output dynamic generator requires no closely associated auxiliary equipment for outstanding results. Built of finest materials with flawless workmanship, each unit is laboratory calibrated to insure specification standards . . . Write for complete details.

THE TURNER COMPANY

900 17th Street N. E., • Cedar Rapids, Iowa
IN CANADA: Canadian Marconi Co., Montreal, P. Q., and Branches
EXPORT: Ad. Auriema Inc., 89 Broad Street, New York 4, N. Y.

TURNER Microphones BY TURNER

TUBES
IMMEDIATE SHIPMENT
TERRIFIC DISCOUNTS
ALL MERCHANDISE FULLY GUARANTEED
EVERY CRITICAL TYPE
WE CARRY TREMENDOUS STOCKS OF HARD-TO-GET TUBES

Make This Your Headquarters for Critical Type Tubes

Tele Vision Materials Corp.
114 LIBERTY ST., NEW YORK 6, N. Y.
COrtlandt 7-4307

Columbia
GEM OF THE SURPLUS

TBY WALKIE-TALKY: VHF Transceiver. 28-80 mc., 4 bands. Voice or MCW, crystal calibration on 130 channels. Unlimited receiving. Approx. 5 W. transmitting. In carrying trunk, complete with vibropack, headset, mike, spare tubes and canvas carrying case. In excel. cond. The whole deal $47.50

R-100/URR PORTABLE RADIO RECEIVER
220/110 V. AC-DC or battery pack. Covers broadcast 160, 80, 40, & 20 meters in 3 continuous bands from .54-19 mc. RIGS LIKE THIS ARE FEW AND FAR BETWEEN! Take it to the beach, picnics, trips, or use at home for SWL. Metal case will really take a beating. Use built-in speaker or phones. Good condition. ONLY $34.95

RUBBER BALLOONS: Git ready to ride the winds. These expand to 4 ft. Ideal for antennas & signaling. New in cans. Each $1.95

APN-4 INDICATOR: Makes swell foundation for scope. Comes with 5" tube and shield. Put tubes in to make ideal PPI marine radar. Complete, less tubes and crystal. Excel. cond. New Low Price $9.95

Ahoy! Marine Gear Specials! Look Alive!

BOAT OWNERS! COLUMBIAN MARINE TRANSMITTER: Kill your transmitter trouble once and for all! Check these outstanding features! 12 or 24 V. optional. 120 W. output rated at 100% modulation. 4-channels, xtal control on your freq. WILL MATCH ANY ANTENNA! FCC approval guaranteed. Dimensions: 19¼x16¾x 7¾ inches. COMPLETE with dynamotor, cords, mike, tubes, pretuned and ready to go. We got it cheap, so we're sellin' it cheap!
ONLY $249.00

MARINE COMBINATION
25 W. 12 or 24 V. input. BC223 Transmitter with PE125 AX vibrator supply and BC-652A Marine Receiver. Set aligned and ready for installation. Less xtals. Excel. cond. ..$89.95
COMPLETE ARN-7 MARINE ADF COMPASS. DON'T GET LOST AT SEA! Includes 24 V. inverter, loop, compass indicator, control box, relay, plugs, flex cable and rack. Excel. cond.
ONLY $89.95

CHEST SETS
TD-1-A: Has F1 carbon capsule in mike, on-off switch, approx. 8 ft. of cord and plug. Excel. for mobile work or home xmtr. New, boxed $2.95

ARC-5 OR 274-N TRANSMITTERS COMPLETE

2.1-3 mcs. Excel. for ship use	$12.95
4-5.3 mcs. Used, excel. cond.	3.95
5.3-7 mcs. Used, excel. cond. Less xtal	4.50
7-9.1 mcs. Used, excel. cond. Less xtal	10.95

ARC-5 OR 274-N RECEIVERS

3.6 mcs., excel. cond.	$ 4.95
6-9.1 mcs., good cond.	6.95
190-550 kcs., excel. cond.	12.50
Command Receiver 28V dynamotor	.79
Command Knobs for Receiver. Ea.	.69
MD7/ARC-5 Plate Modulator. Less dyn.	7.95

274N ANTENNA RELAY BOX
Contains RF meter plus 50 mmfd H. V. vacuum cond. and relay. New in carton 2.95

SIGNAL LAMP
Pistol grip. 12 V. 6.6 amp. Use it on your car. Or even on yer boat, launch or yacht—you plutocrat! NEW in original box. Only $2.50

METERS! THE BEST BUYS IN THE BOOK!

0-3 VDC 2 in. round. Simpson	$2.49
0-15 VAC 3 in. round. Weston or Roller-Smith	3.29
0-50 amp. AC 2 in. square. Triplet	2.99
0-25 MADC 2 in. round. Weston	2.99
0-50 MADC 2 in. square. Simpson	2.99
0-2 amp RF 2 in. round. Thermocouple type.	2.99
0-9 amp RF 2 in. round. Westinghouse	2.99

CONTROL UNIT C-58/APT-1 complete with 0-1 mil movement with 0-200 scale. Box contains 2 toggle switches, control knobs, panel light, etc., all for only 4.50

RADAR CONTROL BOX: 110 V. latch-type relay. Has a raft of uses. Operates radio, coffee pot, toaster, etc., remotely $2.75

OIL-FILLED CONDENSERS! HOT BUYS!

3 mfd.	1500 VDC	$1.79
10 mfd.	600 VDC	1.39
2 x 8 mfd.	600 VDC	1.95

BC-683 RECEIVER: Freq. 27-39 mc., push-button or manual tuning. FM 300 kc. wide. Easily changed to AM. THIS IS THE FINEST RECEIVER OF ITS TYPE AVAILABLE. Complete with all tubes and dynamotor. Excel. cond. ONLY $39.50

TS-16 APN SIGNAL GENERATOR: Used with radio-aircraft altimeter for checking and aligning sets. Complete. Excel. cond. $39.95

MN-26C RECEIVER: Freq. 150-1500 kc. 28 V. with control box, flex. cables, azimuth indicator, loop, and loop cable. Extra hot for aircraft or marine use. Most parts brand new. THIS IS HOT! Only $34.95

TUBES! STOCK UP WHILE U CAN!

715B	$ 8.95	6SN7GT	$2.00
C5B	9.95	6J5	1.45
2G2	34.95	1C5	1.09
2J22	....	OZ4	1.00
703A	2.49	6AC7	2.50
701	3.95	6H6	.89

HAMS! HIGHEST PRICES PAID FOR CLEAN EQUIPMENT • TELL US WHAT U HAVE

COLUMBIA ELECTRONIC SALES
522 South San Pedro Street
LOS ANGELES 13, CALIFORNIA

Eliminating TVI Caused by the BC-610

Crowded urban conditions make it more important than ever to stop annoying transmitter radiation.

By
R. H. MITCHELL,
W4RQR/5

WHEN the writer returned from overseas duty in 1947, TVI was just a problem encountered by other hams. The transmitter in use was a BC-610, and we were sure that, when TV invaded our neighborhood, the excellent design of the transmitter would guarantee no TVI.

Fortunately, until 1949, we lived far enough from anyone owning a television set to make that premise valid. Then we moved into a six-family apartment house in Quantico, Va. One television receiver was already installed in the building. Several more families were considering installing sets. There were at least a dozen more sets within 100 yards of the new transmitter location. Quantico is thirty to forty miles from the nearest TV stations, so the writer expected trouble.

The transmitter was installed. Checks with S-36 and SX-42 receivers showed tremendous harmonics all through the v.h.f. ranges. The writer then purchased a *Hallicrafters* seven-inch metal cabinet receiver. All channels were blocked by the transmitter six feet from the TV receiver. So, we started trying every measure we'd read about.

As one ham described it, the trouble wasn't TVI. It was TVE—television elimination. Five months later, we had the transmitter clean enough so that no interference was discernible in the receiver, other than a change in picture size with transmitter keying. This was cured quite easily by using a constant voltage transformer on the television receiver.

Heroic modifications had been made during this period. The r.f. deck of the BC-610 had been shielded, meters shielded, all leads to the supply deck shielded and double filtered, v.h.f. chokes and r.f. chokes installed, extra bypass condensers installed, line filters installed, *LC* ratios of all tuned circuits decreased, plate-to-ground and grid-to-ground condensers installed on all stages, traps tried (and discarded), low-pass filters of several types tried, one of the parallel 807 buffers removed, plus other measures. We found it necessary to install a line filter and high-pass antenna filter at the receiver in the early stages of modification.

During the entire period, at least two checks were made after each measure had been tried. The first was made with the TV receiver, in order to get a qualitative check on the success of the measure; the second with the S-36 for a quantitative check. The S-36 was four feet from the BC-610. Additional checks were made from time to time on an SX-42, some thirty feet from the transmitter, and on an S-37 that we couldn't borrow long enough to use continuously.

Certain facts stood out on our final tally sheet. Virtually every measure tried (with the exception of the tuned traps) did some good. Most of them, unfortunately, made only one or two decibels difference in the "interference quotient" of the rig, and the most difficult modifications made seemed to have done the least good. Three measures, the easiest three, had done the most good. These were a shielded low-pass filter, the shield bolted to the transmitter; a shielded line filter, also bolted to the transmitter; and double coaxial lines used for the leads from the a.c. outlet to the transmitter line filter.

Our earlier attempts with the antenna low-pass filters had been made with the filter lying on a table, some two feet from the transmitter. That wasn't effective, so we removed the antenna terminals from the 610, bolted the filter across the holes left on the side of the 610, and ran a lead from the 610 output link into the filter through a hole drilled in the filter can. (Incidentally, several home-built filters were tried, and all worked well. They varied from a 3-section to a 10-section with 6 M-derived sections.)

The same considerations applied to the power line filter. Unless it was shielded, and the shield bolted to the transmitter back, we might as well not have had the filter. The BC-610 uses a "Twistlock" power plug, so the filter can't be bolted over the hole for the plug. We compromised here, and ran flexible four inch leads from the power plug into the filter.

The last measure listed above, the double coaxial power leads, whipped a baffling problem. After everything else had been done, there was still some interference on the two high

channels (7 and 9) we were using for a check. The interference was traced to the BC-610 power lead, and could be eliminated on one channel or the other, by coiling up the power lead or by moving it about. Then, it was noticed that if someone stood near certain points on the power lead, the interference increased greatly. We finally decided that the trouble was caused by incomplete bypassing action of the condensers in the line filter unit. Various condensers of all sizes were tried in the unit, but all were ineffective. (The "Hy-Pass" condensers were not available at the time. These might have cured the trouble.) RG-8-U had worked well in high voltage leads, eliminating TVI traceable to such leads. So, we cut two eight-foot lengths of RG-8-U and used them for power leads. The shields of the RG-8-U were tied together at each end, the shields on the a.c. end grounded to a waterpipe, and the shields on the filter end grounded to the transmitter.

That cured the trouble. Evidently, the 30 μfd. of capacity in each foot of the RG-8-U acted as a good long-path v.h.f. bypass.

Thus, after five months, the 610 caused no TVI on our receiver. 80, 40, 20 and 10 meter bands were used. On 80, we used a vertical antenna which ran for forty feet within three feet of our TV lead-in. By this time there were three other TV sets in the building. None of these was treated for TVI (high-pass filter or line filters). None showed TVI. Checks with other neighbors (at least 20 TV sets within 100 yards, by now) revealed no TVI.

Shortly after this, W4PFC, the ham club of the Marine Corps Schools, Quantico, got a BC-610. Major Kozak, W4OUK, director of the club, asked the writer to help clear up TVI there. The station was causing interference over an area with a radius of about a half-mile. We decided to go at it the easy way. A shielded low-pass antenna filter and a shielded line filter were installed and RG-8-U power leads installed. No other corrective measures were taken. All TVI was gone. One man had installed a TV set in the barracks where W4PFC was located. The receiver was only thirty or forty feet from the transmitter, while the antennas were only fifteen feet apart at one point. No interference was discernible on this receiver. W4PFC was being operated on 80, 40, and 20 meters only at the time so no check was made on 10 meters.

Since then, these three measures have been taken on several commercially built transmitters, BC-610's, and other types. The measures were effective in every case.

The wiring system is such in some buildings that the power lines themselves can do considerable radiating.

Of course if the RG-8-U is doing its job properly this should not occur, but the addition of a good earth ground will help in difficult cases when all the other precautions have failed to reduce the interference to a tolerable

Engineering Achievement

Since the Eiffel Tower was first opened 62 years ago this month it has thrilled millions and become a world-famous Parisian landmark, standing as a monument to the engineering skill of its builder.

Similarly the "T. E. I." insigne of Thomas is a hallmark of picture tube engineering and production skill known throughout the television industry. More than one-half million homes today enjoy the finest television reception on Thomas picture tubes.

For, manufacturers, distributors, and servicemen alike know that when they buy Thomas, they buy an engineering achievement! See just how good a tube can be—try Thomas!

THOMAS ELECTRONICS, Inc.
118 Ninth Street Passaic, New Jersey

VERSATILE! KLIPZON* CRYSTAL PROBES

KLIPZON self-holding points FREE BOTH HANDS

NO HAND CAPACITY

FOR EASY ONE MAN TV ANTENNA directional ADJUSTMENTS

Klipzon HIGH FREQUENCY Crystal Probes bring added versatility to your VTVM or VOM

With a KLIPZON Type V or C Crystal Probe handy . . . your VTVM or VOM becomes a VHF instrument

Type V provides accurate means of measuring voltages up to 200 Mc with your VTVM . . . Input resistance .25 megs. @ 500 Kc . . . 150,000 OHMS @ 10 Mc . . . 25,000 OHMS @ 100 Mc.

Type C adapts VOM for indication and comparison of VHF voltages . . . for peaking IF's . . . checking GAIN . . . C.R. Oscilloscope wave analysis . . . for maximum signal, minimum ghosts.

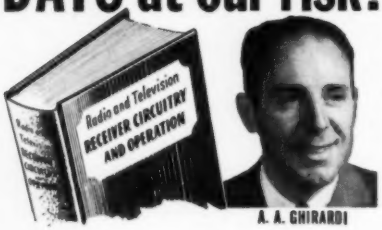
Write for folder C-1 describing many Radio and TV uses. *TM

At Your Local Parts Distributor

UNITED TECHNICAL LABORATORIES MORRISTOWN, New Jersey

Learn Circuits from A to Z...and Watch Service Troubles Disappear!

Read This NEW GHIRARDI BOOK FOR 10 DAYS at our risk!



A. A. GHIRARDI

Here—just out—is the latest and greatest of the famous A. A. Ghirardi books, "RADIO AND TELEVISION RECEIVER CIRCUITRY AND OPERATION"! Actually, despite the many circuit variations, there are only a few really basic circuits in modern radio, FM and television receivers. Let this big, profusely illustrated book teach you all about these—and you'll be able to handle all types of service faster, better and lots more profitably!

HANDLE TOUGH JOBS IN ½ THE USUAL TIME!

Starting with a clear explanation of AM and FM, RADIO AND TELEVISION RECEIVER CIRCUITRY AND OPERATION then progresses to a complete understanding of ALL basic circuits. You learn how each circuit operates—what it consists of—how to recognize it quickly—how to trace troubles with a minimum of laborious testing—how to make repairs promptly. By making it easy for you to understand each circuit and its relation to other circuits, this great book helps you go right to the seat of the trouble with far less time and effort. It speeds up your work. It makes it easy to understand new receivers—to know just how they function and how to service them quickly and accurately.

NO OTHER BOOK LIKE IT!

Prepare yourself for bigger jobs, better pay! Send coupon today. Read this great book for 10 full days under our MONEY-BACK GUARANTEE offer.

10 DAY MONEY-BACK GUARANTEE

Dept. RN-41, Rinehart Books, Inc.
Technical Division, 232 Madison Ave.,
New York 16, N. Y.

☐ Enclosed find $6 for A. A. Ghirardi's new RADIO AND TELEVISION RECEIVER CIRCUITRY AND OPERATION book; or ☐ send C.O.D. and I will pay postman this amount plus postage. If book is not satisfactory, I will return it after 10 days and you guarantee to refund my $6. (Price $6.50 cash only outside U.S.A.—same return privilege.)

Name .....

Address .....

City, Zone, State .....

level. The lead to the earth ground, if used, should be varied in length by experiment as a resonant length may simply add to the woes.

So, if you are troubled with TVI, don't start by ripping the rig apart. If your transmitter is of fairly decent design and is reasonably shielded, try these measures:

1. A shielded low-pass antenna filter, the shield bolted to the transmitter.
2. A shielded line filter, also bolted to the transmitter.
3. Parallel coaxial power leads.

These measures can't be guaranteed in every case, but they may save weeks or months of work.

A few items that were found during our test work may be of interest to anyone working on TVI problems.

1. Don't follow the recommended procedure of working stage-by-stage in TVI reduction, especially with pentode stages, unless each stage is loaded. We spent a month trying to get our 807 stage clean, only to find that it was clean when loaded. No unloaded pentode will be clean unless it is neutralized or made heavily degenerative. We got wise to this when it was found that the 250TH output caused far less trouble than the 807 buffer.

2. When a dummy antenna is used on the rig, make sure that the dummy is shielded. This has caused the writer and others much needless work.

3. In pentode stages using series plate and screen resistors, watch out for dynatron type oscillations when excitation is removed. In our 6L6 buffer, a 50,000 ohm resistor dropped 450 volts for the screen supply, while a 5000 ohm resistor dropped the 450 volts for the plate supply. This stage used cathode bias and oscillated badly when excitation was removed. A check with a v.t.v.m. showed 420 volts on the screen and 290 volts on the plate. Changing to voltage divider screen feed cleared up this trouble.

4. Plate-to-ground and grid-to-ground condensers do more good than any other single measure taken inside the rig. A 5 $\mu\mu$fd. ceramic condenser direct from grid-to-ground, and from plate-to-ground on lower power stages will be satisfactory. On high power stages, use high voltage vacuum or tubular condensers for a short plate-to-ground lead.

5. Keep plenty of capacity in grid tuning circuits. Remember that grid circuit impedance is much lower than plate circuit impedance in a class "C" amplifier.

6. With capacity coupled stages, use much higher than normally recommended values of coupling condensers. Values in the order of .002 μfd. at 80 meters, to 500 $\mu\mu$fd. at 10 meters make for a much stabler stage than do the usual values of 100 $\mu\mu$fd. or less. This will cure a nervous pentode stage, in a great many cases.

7. Don't get discouraged. TVI can be whipped, and with the information available to us now, it can be done in short order.

—30—

SAVE!

UNUSED

ELECTRONIC COMPONENTS

Pieces	Part No.	Description	Price
300	AN3135-1	Bulb	$ 1.10
9000	45	Bulb	.08
11000	1667	Bulb	.20
1000	987	Bulb	.40
35	RA-10-DP	Receiver	75.00
20	TA12B	Transmitter	90.00
150	DA-1F	Dynamotor	22.00
162	3611-B	Amplifier	72.50
35	MR-9B	Control Box	27.50
7	AS27A/ARN-5	Antenna	22.50
87	MR16D	Filter	28.00
97	FT213	Mount	4.40
54	FT293	Mount	4.25
80	BX42-7	Dynamotor	18.00

All prices F.O.B. Baltimore, Md.

IMMEDIATE DELIVERY!

Send check or money order with order. Sold on open account to rated firms.

COMMERCIAL SURPLUS SALES CO.
4101 Curtis Ave., Baltimore 26, Md.

ARE TUBES YOUR PROBLEM?

Draw from one of the largest inventories in the East.

Radio—Television—Transmitting

Write or Phone **Louis H. Grossberg**

SOLO ELECTRONIC SALES CORP.
190 Washington St., New York 7, N. Y.

Send For Pamphlets of 1,000,000 Non-Critical Receiving Tubes
Excellent as Substitutes—up to 90% off list.

Consecrated to Quality Output and Golden Rule Service

ASTRON

Write for catalogue

Fixed Capacitors and RF Interference Filters

ASTRON CORPORATION —— 255 Grant Ave., East Newark, N. J.

COME AND TALK OVER YOUR AUDIO PROBLEMS WITH

HARRISON'S Sound Shop's

EQUIPMENT CONSULTANT BEN PINZ

HARRISON RADIO CORP.

225 Greenwich St. • N. Y. C. • BA 7-7777

ANOTHER OUTSTANDING JOBBER

RADELCO, INC.

246 West First Street
Mount Vernon, N. Y.

$25.95

HAS THE SENSATIONAL NEW EICO 221-K VTVM KIT IN STOCK!

Servicing Hints

(*Continued from page 61*)

the bulb. Excessively low voltages are usually below the striking voltage, consequently they will not light the neon lamp. Plate voltages in resistance coupled circuits will not sustain ionization of the lamp. Placing the probe on the plate of the 12SQ7, for example, will result in a momentary flash, or a series of flashes, but will not glow steadily due to the voltage drop occurring across the plate load resistor when the neon bulb draws additional current (approximately 2.4 ma.).

Check audio coupling condenser for leakage. In the absence of a suitable meter, leakage through the coupling condenser between the 1st audio plate and amplifier grid can be checked with the neon lamp. Disconnect the grid end of the condenser, turn the set on, and connect probe to the loose condenser lead. Leakage will be indicated by repeated flashing of the neon lamp. An initial flash indicates only the charging of the condenser. (Disconnecting the condenser in this manner is a good procedure, even when using a meter. When using a meter, presence of any sustained voltage indicates leakage.)

When using a signal generator or other instruments on an a.c.-d.c. set, it is not uncommon to experience an annoying 60 cycle modulation. Connecting these instruments to the ground as described previously will result in a "clean" signal. In sets with the common side of the line isolated from the chassis, it may be necessary to connect the ground lead from the test apparatus directly to the line instead of running it to the chassis. This can be done safely by observing the lamp to make sure the ground lead is connected to the neutral side of the line.

—30—

MASK ON TV TUBE

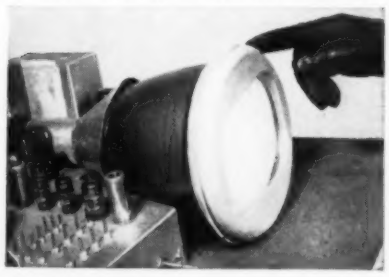
By H. LEEPER

CERTAIN TV receivers using an electrostatic picture tube have a rubber cushion or mask between face of the tube and cabinet opening.

When working on these sets it is best to keep the rubber mask on the face of the tube to keep it from being scratched or struck with tools.

—30—

Retain that protective picture tube mask during servicing and prevent accidents.



ARROW "The Home of Values!"

SCR 508

BC 603 Receiver.$24.95
BC 604 Transmitter 19.95
BC 605 Amplifier 4.95
BC 606 Control Box ..... .95
FT 237 Mounting 9.95
MP 48 Mast Base 2.95
MS Mast Sections $0.49
Set of 80 Crystals 19.95
DM 34 12 Volt Dynamotor(Rx) 9.95
DM 35 12 Volt Dynamotor(Tx) 14.95
TM 11 600 Manual 2.50

All of the above equipment is in excellent used condition and may be purchased as individual components or as a complete installation at **$99.50** with all of the above components included.

MN 26 Y Compass Receiver, twelve stage superhet covering frequencies of 150 to 325 KC; 325 to 695 KC; and 3400 to 7000 KC in three bands. These units are brand new but with Dynamotor, Band switch motor and tubes removed. Schematic Furnished. While they last ..... each **$4.95**

CONDENSER SPECIAL
Ten assorted for only **$1.95**
Typical Values:
1 mfd. 400 VDC
1 mfd. 800 VDC
1 mfd. 500 VDC
1 mfd. 1200 VDC
2 mfd. 400 VDC
Metal canned with mounting brackets.

TS 10—Sound powered phones—Brand New **$10.00** ea. 2 for **$17.95**

RT7/APN1 TRANSCEIVER UNIT—

Used as an altimeter, it may be converted for signaling control circuits, etc. Complete with 14 tubes and dynamotor they are in good used condition at the amazingly low price of..... **$6.95**

BC 620—Receiver-Transmitter—2 crystal channels —20 to 27.8 MC FM—13 tubes. Metered, Plate and Filament ..... Used **$9.95**
PE 97 or **PE 117** or **PE 120** Power Supply for above 6-12 volt vibrator type.
Used less tubes, vib. & con. **$2.95**
Used, complete **6.95**
FT 250 Mount for both BC 620 and PE 97 New **1.50**

SURPRISE PACKAGE
20 lbs. Ass't radio parts. A $25.00 value for only **$1.95**

FLAP PITCH MOTOR
24 VDC will operate on AC—3300 or 11,000 R.P.M. Complete with gear box and limit switches ... each **$2.95**

AS-138/ARN—10 inch streamline loop as used with direction finding receivers. Fixed position, it is ideal for planes, boats, automobiles. ..... New **$1.95**

RA 52—Rectifier
A Transtat controlled rectifier to produce high voltage DC from a 110 VAC 60 cycle source. Up to 12,500 volts DC at 50 watts. Metered high voltage (0-15 KV) and current (0-20MA). New **$74.50**

MISCELLANEOUS SPECIALS!

	Used	New
RA 10 DA Receiver	$17.50	$24.95
RT7 APN1 Transceiver	6.95	9.95
BC 347 Interphone Amplifier	—	2.95
BC 442 Less Condenser	1.49	1.95
APS 13 UHF Antenna, Pair	—	.98
FL 8 Filter	—	2.95
I-97 Bias Meter	3.95	4.95
RL 42 Antenna Gearbox Motor and Reel	4.95	7.50
AN ARC-5 VHF Transmitter (T-23/ARC-5).		New 29.95

One Tube Interphone Amplifier—Small compact aluminum case fullyenclosed. 2¼"x3¾"x5¾" Less Tube ..... New **79c**
40 Amps Circuit Breaker ..... New **59c**
220 M.A. Circuit Breaker ..... New **59c**
Collins VFO Dial—5 calibrated ham bands from 3.2 Mc to 32 Mc; complete with pointer, gears, logging dial and flywheel. Scale 6" on 8" plate ..... New each **95c**
C-18—Antenna coil assembly slug tuned used in BC 603 receiver. Frequency range 20-27.9 Mc.—fully shielded ..... New. 10 for **$1.95**
I 82 F—Five Inch 360 degree compass indicator and Selsyn receiver ..... New **$4.95**
A-81-2 Transmitter Selsyn for I82 indicator.. **$2.45**
(Both I82F & Trans. Selsyn for **$7.00**)
RC 100—Complete or components parts available—Price upon request.

SCR 625 Famous Army Mine Detector
Complete kit, brand new in original suitcase style carrying case. Less Batteries **$79.50**

MONTHLY SPECIAL
BC 709 Battery operated lightweight interphone amplifier. Complete with tube and shock mount, but less battery. New **$3.59** ea. 2 for **$6.00**

All shipments FOB warehouse. 20% Deposit required on all orders. Minimum order accepted—$5.00. Illinois residents, please add regular sales tax to your remittance.

COMPASS RECEIVER MN-26
Remote control commercial type navigational receiver. Indicates direction of any desired transmitting station. 3 bands—frequency range: 150 Kc to 1500 Kc; has 12—6-V. type tubes. Brand New **$39.95**
Accessories for Above:
Loop MN-20 ..... **$ 9.95**
MN-28 Control Box **10.00**
MN-52 Loop Control Unit **4.45**
Loop Transmission Cable—168" long **9.95**
MC-124 Flexible Shaft **2.45**
IN-4D Left-right Indicator **9.95**
Set of 3 plugs **4.60**

COMMAND (SCR 274 N) EQUIPMENT

	Used	New
BC-455	$ 7.95	$ 9.95
BC-457	5.95	—
BC-458	5.95	8.95
BC-696	14.95	24.95
BC-450—3 Receiver Remote Control	.89	1.95
BC-442	—	2.95
3 Receiver Rack	1.95	—
2 Transmitter Rack	1.50	—

TUBE SPECIALS!

1625	$0.39	805	$3.29	837	$1.19
1626	.39	807	1.89	860	4.95
211	.39	813	6.95		
803	2.89	832A	7.95		

CATHODE RAY TUBES

3FP7	$1.95	5BP1	$3.95	5GP1	$3.95
3GP1	1.95	5BP4	3.95		
4AP10	1.95	5FP7	1.95		

CABINET CH-118
Olive drab in color, this cabinet has a full length interlock access door on the rear. The front takes the standard 19" panels with 60 inches of height and 20 inches deep. It is shock mounted on a heavy steel platform and has a two-inch protrusion fully covering one side to accommodate wave trap and wiring. Louvered vents allow air circulation top and bottom. **$34.50** each F.O.B. Chicago.

ARROW SALES, Inc. Dept. N, 1712-14 S. Michigan Ave., Chicago 16, Ill. PHONE: HArrison 7-9374

WE HAVE LARGE QUANTITIES OF **RADIO TUBES**

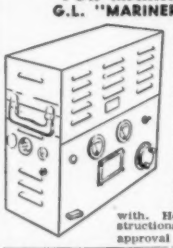
TYPE	TYPE	TYPE	TYPE	TYPE	TYPE	TYPE	TYPE
1A5GT	2E22	6AQ5	6C6	6SG7	12SG7	OZ4A	807
1G6GT	2X2	6B8	6H6	6SH7	12SH7	VR150/30	808
1LD5	3AP1	6B8G	6J5	6SK7	12SK7	42	813
1LN5	6AB7	6BE6	6J5GT	6SK7GT	12SR7	357A	830B
1R5	6AC7	6C21	6K6GT	6SS7	35Z4GT	803	866A
1S4	6AK6	6C4	6K7GT	7Q7	50L6GT	805	9005
1T4	6AL5	6C5GT	6N7GT	12A6	Prices on Request		

All tubes are brand new standard brands. This offer subject to change without notice and prior sale. Terms: 25% deposit with order, balance C.O.D. $25.00 minimum order.

MANUFACTURERS: Interested in EXPORT? CONTACT: MICHEL LEVIT

METROPOLITAN OVERSEAS SUPPLY CORPORATION
MANUFACTURERS AND DISTRIBUTORS OF ELECTRONIC PRODUCTS
1133 BROADWAY, NEW YORK 10, N. Y. CHelsea 3-1105

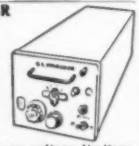
FOR MARINE RADIOMEN
G.L. "MARINER" TRANSMITTER



180 w input, 120 w to antenna, 90% modulated, 4 channel xtal cont. 12 or 24 v input with dynamotor, connecting cord, xtals, tubes, mike, all aligned and ready to operate. (Specify volt. and freq. when ordering.) Contains break-in relay for recvr in addition to ant. switching relay. Dimensions: 8¼" deep, 17¼ wide, 19½" high. Tubes included: 10Y speech amp., two 211 mod., 1625 osc., 1625 IPA, two 814 parallel PA. We add over $150 worth of skilled engineering and parts to equipment which cost U.S. over $1200 to start with. How can you lose? With instructions. FCC license approval guaranteed... **$275.00**

MARINE FREQ. COMMAND RECEIVER NAVY ARA (SCR-274-N) 1.5 to 3 MC spread over entire dial. Very hot! Modified, entirely self contained. (Less speaker.) New! 12V.....$32.50 24V.....$27.50

G.L. "MARINER" RECEIVER



Long wave, broadcast, marine and short wave reception. A beautiful conversion of finest Navy surplus! All controls vernier tuning. BFO ON-OFF and AVC-MVC on entirely new front panel. Coaxial type antenna fittings furnished. Tagged wires out of rear to battery to power a DU-1 loop, and to kill B+ with xmtr break-in relay. 12 or 24 v DC. Only 15½" long, 8" wide, 6¾" high, and self-contained; no plugs needed. With 6 tubes, 2 neon voltage limiters, and dynamotor. Requires an external speaker. Alignment instructions and schematic furnished. **$69.50**

Specify voltage .....

3-SECOND MANUAL DIRECTION FINDER

DU-1. 12 or 24 v. Goes ahead of the G.L. "Mariner," ARA, or any other receiver to convert it to the Marine band. Still retains lower half of broadcast band, and all the lighthouse and beacon band. 2-tube phasing circuit, no 180° ambiguity. Gives true bearing in 3 seconds! Schematic and complete instructions furnished.
BRAND NEW, specify voltage..... $32.50

20-WATT TRANSMITTER

BC-223 TRANSMITTER. 15 to 25 w output, 4 chan xtal control. To modify for FCC approval, just remove a few knobs and put one metal screw into panel to keep channel selector switch from being turned to MO position. WE CHECK THEM OUT! With tubes, 12 v dynamotor PE-55, connecting cable, 4 marine freq. xtals, mike, and schematic. Don't forget to specify xtal freqs. **$89.50**

NAVY WATERPROOF BULKHEAD SPEAKER with universal matching transformer, cord and phone plug **$9.95**

SPRINGTIME SPECIALS
COMMAND RECEIVERS

With schematic, alignment, and AC power instructions.
BC-455. 6-9 MC. NEW $12.95. GOOD USED, $7.95

274N PLUG. 7 prong male plug to fit back of command recvrs and xmtrs. This is the same plug as used in the racks. **NEW, each, 21c; five for...$1.00**

COMMAND TRANSMITTERS
With Dope Sheet and Schematic

T-19/ARC-5. 3-4 mc, repacks, like new.....$10.95
Excellent used 8.95
BC-457. 4-5.3 mc, excellent used..... 4.95
BC-458. 5.3-7 mc, excellent used..... 4.95
BC-459. 7-9.1 mc, excellent used..... 9.95
T-22/ARC-5. 7-9.1 mc, repacks, like new.... 9.95
MD-7/ARC-5. Push-pull mod., excellent..... 9.95
MOD BC-456A. Brand New $5.95. Excellent used 2.49

3-DIGIT resettable Veeder-Root counter with 90° bevel-gear drive, pilot lamp assembly, wafer switch, case. **NEW**..... **79c**

BC 659 Mobile xmtr-recvr 27 to 39.9 mc, FM. 10 mtr and new defense net. 2 chan, xtal control with PE-117 6 v pwr supply. Excellent condition..$39.50

4 USES—4 DOLLARS

The most versatile dynamotor in surplus! The best dynamotor for conversion to 6v. Multiple windings! After conversion you get choice of 190 or 350 v at 50 MA or 250 v at 100 MA. No brushes to shift around, no mechanical work. Or use it as a 2:1 or 1:2 step-up or step-down transformer for DC voltage! Changes 6 to 12, or 12 to 24, or vice versa, up to 3 A. Or use it as a GENERATOR. Turn with motor, get 12 v DC at 12.6 A or 24 v DC at 6.3 A, plus high voltage. Includes easily removable self-contained 600:1 sealed-in-oil gear reduction unit. Complete dope-sheet furnished. **BRAND NEW**..... **$4.00**

R-9A/APN-4. 160-meter Loran receiver plus high (for scope) and low voltage power supply. Three chans. tunable 1.6-3.3 mc, 1 chan, tunable 7.38-11.75 mc. With schematic and instructions for 60 cy. **Excellent used, less tubes**..... **$4.50**

TAPPED POWER! Here is the depot-spares replacement main transformer which enabled the RA-34-F and -G rectifier to furnish COMPLETELY VARIABLE 0-1200 v DC at 400 ma in steps of 20 v. Variable hi-voltage is obtained by using the coarse and fine taps to feed the primary of a 1:10 hi-voltage transformer (not included). Furnished with 3 heavy-duty tap switches all wired up. In addition, it has outputs to feed dry rectifier which put out 12 v at 2.4 A and an AC output of 12-14 v at 12¼ A. Input is 115 or 230 v 60 cy. With schematic of RA-34-F showing all connections. NEW **$17.50**

METALLIC MINE DETECTOR SCR 625 with BA-38 battery. For non-ferrous or ferrous metals. Also operates under water. Brand new, export packed. **$69.50**

BC-347-C INTERPHONE AMPLIFIER
Brand new, with 6F8G..... **$2.50**
Excellent Used, with 6F8G..... **1.29**

FOR RADAR: PE-218 Inverter. 25-28.5 v in. Output 115 v, 15 amp (1.5 KVA), 400 cy.
BRAND NEW..... **$17.50**
Out of original packing..... **12.50**

DYNAMOTORS AND INVERTERS
(Quantity buyers, write for discount.)

FOR AN/ARC-1: DY-9/ARC-1 (27 or 13.5 v). DY-10/ARC-4x (27 or 13.5 v). Output 360 v, 135 ma, cont., or 310 v, 355 ma, int. Guaranteed condition....**$12.50**

FOR T47/ART-13 or ATC: DY-12/ART-13, rotary machine only, no filter-relay base. 27 v in, two outputs: 1150 v, 350 ma; plus 400 v 400 ma. **Brand New**..... **$7.95**

FOR BC-375: PE-73, 28 v in, output 1000 v, 350 ma. **Brand new**..... **$5.95**

FOR A.D.F., 750 VA Inverter MG-149-F: Input 24 v, outputs 115 v, 500 VA, 400 cy; plus 26 v, 250 VA, 400 cy. Excellent used..... **$7.95**

WANTED!
Your Spare Surplus Equipment and Tubes, Dynamotors, Recvrs., Xmtrs., Test Equipment. Send List, stating condition and rock bottom price.

G.L. ELECTRONICS
905 S. Vermont Ave., Los Angeles 6, Calif.
All Prices F.O.B. Los Angeles.
Calif. Buyers Add Sales Tax.

Ham Transceiver

(*Continued from page* 59)

If a single-wire antenna is used the over-all length (including lead-in) should be between 50-60 feet. It is connected to the phenolic covered antenna lead which is located at the rear of the set. Details for constructing a single-wire antenna are given in Fig. 1A.

The construction of the half-wave doublet antenna is shown in Fig. 1B. The length of the antenna in feet is determined by dividing the constant 468 by the operating frequency in megacycles. Generally #12 and #14 enameled wire is best for this type of antenna. If the Novice wishes to purchase a ready-made doublet antenna he will find such units listed in the catalogues of leading parts distributors. These antennas are pre-cut and assembled, ready for erection. Since the impedance at the center of a doublet antenna is approximately 75 ohms, it should be fed with a 75 ohm twin-lead, twisted pair, or coaxial transmission line. In all cases the transmission line should leave the antenna at right angles to the horizontal portion of the wire.

One conductor is connected to the antenna lead at the rear of the set and the other to terminal "G" on the terminal strip. If a coaxial line is used the outer shielded conductor connects to terminal "G."

Receiving Antennas

A short, single-wire antenna of approximately 15 to 20 feet (including lead-in) is recommended for general c.w. reception. A full size antenna of either of the types illustrated for transmitting may be used for receiving modulated or weak code signals; however, the same antenna should never be connected to the transmitter and receiver simultaneously (parallel connected). Of equal importance is the precaution of separating the transmitting and receiving antennas by as great a distance as possible.

General Specifications

The general specifications for the Model SR-75 include a 5" PM speaker with a voice coil impedance of 3.2 ohms. The set uses five tubes plus a rectifier-doubler. The unit is tuned manually and operates from a 105-125 volt, 60 cycle a.c. power supply. The intermediate frequency is 455 kc. and the power consumption is 50 watts. Provision is made for an external antenna with a transmission line or single-wire feed. The headset output is high impedance 1500 to 5000 ohms.

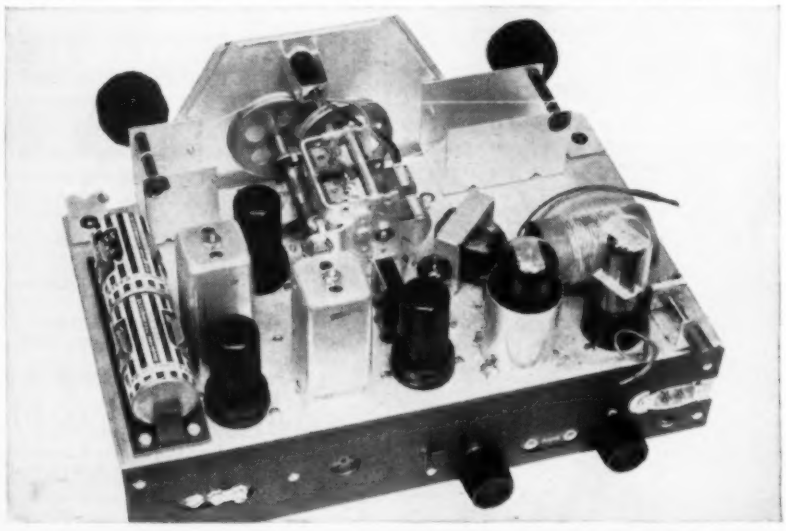
The receiver covers four bands with Position 1 of the band selector switch tuning from 550 to 1650 kc.; Position 2 from 1.65 to 5.1 mc.; Position 3 from 5 to 14.5 mc.; and Position 4 from 13 to 31 mc.

The transmitter has three crystal frequency ranges. From 3.5 to 3.85 mc. provides an output frequency of 3.5 to 3.85 mc.; the 7 to 7.2 mc. crystal frequency covers 7-7.2 mc., 14 to 14.4 mc., and 28-28.8 mc. The crystal frequency of 6.74-6.8 mc. gives an output frequency coverage of 26.96-27.2 mc. The emission is A_1 (c.w.), and the power input is 10 watts. The power output of the transmitter is 7½ watts on 80 meters to 4½ watts on 10 meters.

Many of the features incorporated in the design of this transceiver lend themselves to home construction of transceivers and simple receivers. It is well-known that plenty of DX can be worked with "flea power" rigs. The transceiver described can serve either as a beginner's complete station, and in these troubled times, as a standby or emergency transceiver for the more experienced ham. By eliminating the conventional power supply transformer a reduction of weight has been obtained thus making this little unit easily portable and amazingly compact.

—30—

Top chassis view of the SR-75. Compactness is achieved by careful parts layout.



Mac's Service Shop

(*Continued from page* 61)

Mac's eyes swept fondly across the gleaming array of instruments on the back of his bench as he drawled, "It will take a stronger argument than that to make me toss in the sponge. You've got to remember that no amount of equipment will make a mechanic good, but a good mechanic can make a surprising amount of equipment—especially during these days of high-quality, low-cost service instrument kits and of many magazine articles that tell how to build broadband scope amplifiers, sweep generators, marker generators, vacuum tube voltmeters, and so on.

"In spite of what some of the calamity howlers would like you to believe, even if you buy factory-made instruments, you do not need enough money to make a down payment on a yacht to buy all of the equipment you require to do a bang up job of television servicing. The fellow who has, in addition to the usual radio shop equipment, a v.t.v.m., a good sweep generator, a scope with good gain and frequency response, and a dependable marker generator is equipped to tackle any TV service job, providing, of course, that he knows how to get the most out of these instruments; and a fellow who has either built these instruments or who has selected them after a great deal of catalogue-thumbing and comparing in an effort to make his limited funds go as far as possible, is very likely to be able to do just that."

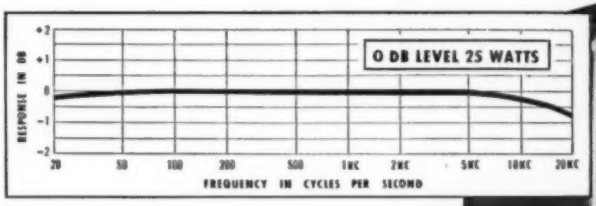
"Yeah, but this writer says the small operator is short on know-how, too."

"That is a generality and is about as worthless as most generalities," Mac said with an impatient gesture. "Some lone-wolf technicians *are* technically unprepared to do TV work, but I know some mighty, mighty dumb ones who work for the big concerns, too. Come to think of it, where do these big outfits get their technicians? Most of them are recruited from the ranks of the independent technicians — especially those technicians who fail in making a go of their own shops. Wonder what magical quality it is that transforms these former 'screwdriver mechanics' into 'carefully trained technicians' just as soon as they are put on the payroll of a large concern!"

"For your money, then, a small operator is likely to be just as good a technician as a fellow working for a big shop."

"Affirmative! In the first place, a man has to have both initiative and self-confidence to strike out for himself, and these two qualities are the foundation for a good TV technician. When you don't have anyone else to whom you can pass the buck, you just have to buckle down and work out your own problems, and that is precisely how a good technician is made. Then, too, the man who is his own entire technical force has to be familiar

STANCOR *High Fidelity* OUTPUT TRANSFORMERS



Curve represents an average response of the ten transformers in this series. Units used for this test were drawn at random from current Stancor stock.

±1db FROM 20 TO 20,000 cps

Premium Quality at Low Cost

Stancor has taken advantage of the most advanced design and manufacturing practices to bring you a series of output transformers combining outstanding audio response with very moderate cost.

Extensively interleaved "trifilar" windings, extremely tight coupling, and careful electrical balance result in audio fidelity to please the most critical specialist. An inexpensive, but thoroughly practical, type of mounting is used since elaborate shielding is not required at the audio output power level.

Listed part numbers have a maximum power level rating of 50 watts and provide a wide selection of impedances for popular amplifier applications.

PART NO.	PRI. IMP. (P-P) IN OHMS	SEC. IMP. IN OHMS*	MAX. PRI. D. C. PER HALF	NET PRICE
A-8050	1500	8, 16	200 ma	$10.86
A-8051	2500	8, 16	150 ma	10.86
A-8052	3000	8, 16	175 ma	10.86
A-8053	5000	8, 16	150 ma	10.86
A-8054	9000	8, 16	100 ma	10.86
A-8060	1500	500	200 ma	10.86
A-8061	2500	500	150 ma	10.86
A-8062	3000	500	175 ma	10.86
A-8063	5000	500	150 ma	10.86
A-8064	9000	500	100 ma	10.86

For complete specifications and prices of more than 450 stock part numbers, including other high fidelity transformers, see the current Stancor catalog. Ask your distributor for a copy or write direct.

STANCOR

STANDARD TRANSFORMER CORPORATION 3584 ELSTON AVENUE, CHICAGO 18, ILLINOIS

Critical Tubes and Wire...

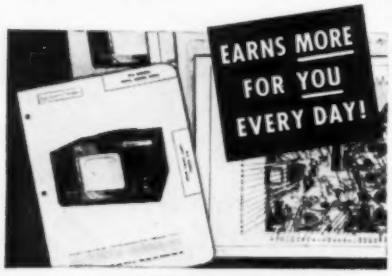
Credda Offers Large Quantities of Scarce Radio and Television Tubes and 300 Ohm Wire to Rated Accounts.
All Tubes are Guaranteed First Quality.
Wire Supplies Include the Critical RGU-59 and RGU-11.
Act NOW to Lick Your Shortage Problems!

Write or Wire . . .

Credda Inc.
19 W. 26th Street New York 10, N.Y.

USE PHOTOFACT

the world's best Radio-TV service data—it pays for itself every working day



***Try* PHOTOFACT!**

FREE We'll send you any Photofact Folder listed in the Photofact Cumulative Index

WE'LL PROVE YOU'LL SAVE TIME and EARN MORE WITH PHOTOFACT

NOW—learn for yourself—at our expense—how PHOTOFACT makes your Radio and TV work *quicker, easier, more profitable!* Examine an actual PHOTOFACT Folder. Use it. You'll learn first-hand why over 35,000 successful service technicians use PHOTOFACT daily. You'll learn that no other service gives you PHOTOFACT's *completeness, accuracy, uniformity,* and *lowest cost.* PHOTOFACT is the *only* radio and TV service data prepared from laboratory analysis of the actual equipment. Know the facts—get your FREE Folder now. Examine, use, compare—learn why no modern service shop can afford to be without PHOTOFACT!

WRITE FOR FREE INDEX

PAY AS YOU EARN! Ask your distributor about this amazing plan. Only $18.39 puts the entire profit-boosting Photofact library in your shop now!

NOTE: Our FREE Folder offer is limited to Service Technicians only. Attach coupon below to your letterhead and mention your jobber's name. If you have no letterhead, send coupon to your jobber. Experimenters and others may obtain the Photofact Folder by remitting amount shown below.

HOWARD W. SAMS & CO., INC.
2201 E. 46th St., Indianapolis 5, Ind.

☐ Send FREE Photofact Cumulative Index
☐ Send Full Easy-Pay Details

I am a Service Technician:
☐ Send FREE Folder for set model.....

I am an Experimenter: Enclosed $.....
☐ Send Folder for set model.....
TV-$1.00. Record Changer or Comm. Receiver-75c. AM/FM-50c

Name.....

Address.....

City.....Zone...State.....

with every phase of television from the antenna installation right down to the picture tube and the speaker. He is not so likely to be a narrow specialist as is the case with large company technicians.

"Most important of all, though, the little guy has every possible incentive for doing the best work he is capable of doing. He knows that his whole business and all the time and money he has put into it depends upon the quality of the work he turns out. If the ability to work hard and carefully is in him at all, that knowledge will bring it out. Doing sloppy work and loafing on the job is about as smart for the one-man operator as cheating at solitaire."

"Do you think a technician can make as much money working for himself as he can working for a large shop?"

"That is impossible to answer because it depends upon so many variables, of which one of the most important is: how good a business man is the individual technician? Unfortunately, good technical ability and good business ability do not always grow naturally on the same tree, and that accounts for a great deal of the trouble encountered by the small service shops. This weakness has been recognized, though, and more and more space is being given in the trade publications to educating the technician along business as well as technical lines.

"But there is another important fact that no Big Time Operator will probably ever quite understand: money taken in is not the full measure of the independent technician's pay. A mind that is filled with inventories, manhours, depreciation, ten-day discounts, etc., can never quite grasp the deep satisfaction that a first-class mechanic receives from doing a fine job of repairing a broken or defective mechanism or circuit in his own way, on his own time, and with his own tools. There is something *creative* about that kind of work that makes it altogether different from doing the same thing for an employer's pay. A funny thing about an average American is that he prefers being the whole works of a small machine to being a small cog in a big machine. As long as this is so, we shall have independent technicians; and I hope I never see the day when it isn't so."

"Don't you think we ought to have large service shops?"

"Certainly we should have them. Large shops are needed, especially in cities, to take care of the immense amount of work that must be done and done fast. I have no quarrel with big shops, but I insist that there is plenty of room and plenty of work in this country for both the large and small shops. What I hate is this attempt on the part of a few large organizations—and it is by no means all of them—to try to 'smear' the independent operator with blanket charges of inefficiency and dishonesty.

"The auto service industry has been going through this same thing for

COAXIAL CABLE CONNECTORS

83-1AP	$ .30	83-1SP	$ .45	83-16B	$ .15
83-1P	1.30	83-1SPN	.50	83-1B5	.15
83-1H	.09	83-1T	1.30	UG-27/U	.68
83-1J	.80	83-22AP	1.10	UG-58/U	.63
83-1R	.40	83-22R	.48	UG-85/U	.88

Others in stock. Write for prices.

AN CONNECTORS—IMMEDIATE SERVICE
Phone! Wire! Write! Your Needs.

1N34 CRYSTAL.....79c

VERNIER DIAL or DRUM (from BC-221)
DIAL—2½" dia. 0-100 in 360°. Black with silver marks. Has thumblock. DRUM—0-50 in 180°. Black with silver marks.....either 85c

SELSYN 2J1G1—Brand New—400 Cyc.....$1.90

400 CYC. INVERTER—In, 28V 92A; Out, 115V 400 Cyc, one phase, 1,500VA, .90PF.....$12.50

THROAT MIKE (MT 81-A). 2 mikes in leather zipper case with 36" cord & PL68—Brand New.....59c

CARBON MIKE T-17, slightly used—Guaranteed—Has 5 ft. cord and PL68.....89c

CHOKES—30 H, 80 ma, $1.29; 6 H, 80 ma.....79c

Minimum Order, $3.00—All Orders F.O.B. Philadelphia

RELIANCE Merchandizing Co.
2221 Arch Street ● Philadelphia 3, Pa.
Telephone: Rittenhouse 6-4927

ANTENNA MASTS
Immediate Delivery
New Steel Tubing
1 inch O.D. — 20 gauge
10 foot lengths.....$1.45 each
5 foot lengths.....$ .80 each
Special quotations on quantities exceeding 500 lengths.
TERMS: 25% deposit, balance C.O.D., F.O.B. B'klyn
Clarion Metal Products Manufacturing Corp.
563 McDONALD AVENUE
Brooklyn 18, N. Y. ULster 4-2600

RADIO HANDBOOK
IN TWO EDITIONS

11TH EDITION: The standard work on practical and theoretical aspects of all radio communication.
12TH EDITION: Detailed construction-al information on a wealth of radio communication equipment; all brand-new.
BOTH these top-notch books are a necessity for everyone interested in radio communication. There is little overlap in coverage; each is a perfect companion volume to the other.

FOR EITHER EDITION **$3.00** By mail, $3.25 postpaid. Foreign, $3.50

AT YOUR FAVORITE DEALER
OR DIRECT BY E MAIL FROM
Editors and Engineers
LIMITED
1302 KENWOOD ROAD, SANTA BARBARA, CALIFORNIA

BUILD YOUR OWN GEIGER COUNTER!

It's EASY to build your own Searchmaster Geiger Counter with this COMPLETE kit. Contains everything you need! Headset, tubes, batteries, metal case. Fully guaranteed! Sensitive to both beta and gamma radiation! Illus. instructions. FREE radioactive specimen.
$29.95
SCIENCE KITS LTD.
8049 St. Clair • North Hollywood, Calif.
Write for FREE literature

ANOTHER OUTSTANDING JOBBER
SUPPLIES, INC.
1013-15 Jefferson Ave.
Toledo, Ohio

HAS THE SENSATIONAL NEW
EICO 425-K 5" SCOPE KIT
IN STOCK!

years. Every time a new car design comes out, there are a few who cry that this advance will mean the end of the 'alley garages'; but these small garages are still with us and will probably be doing business when cars are equipped with atomic engines. The mechanic who works on my car and truck runs one of these little shops, and I will stack Homer's mechanical ability, thoroughness, honesty, and essential up-to-date equipment up against that found in any garage you can name. He is good enough that his customers patiently wait two or three weeks just to get their cars into his shop and have him work on it personally.

"I think that what grinds the large operators the most is that the independent technician usually charges less for his service than they do. They consider this 'price cutting' and say that such a practice sabotages the advancement of the whole service business. But that really isn't the case. The little guy is simply using one of his few advantages, low overhead, to offer more attractive rates to his customers. The big outfit can buy replacement parts cheaper because of the size of their orders, and they can smother him with their large advertising budgets, but on top of that they still want to set his charges for him!

"These outfits would do well to practice a fundamental business rule that the independents learned long ago: Don't knock your competitor — even your little competitor. Every time a radioman raises the Pharisee cry that *other* radiomen are crooks and stupid blunderers, he arouses doubts and suspicions in the minds of the people concerning *all* technicians." —30—

WISCONSIN HAMFEST

THE Annual Hamfest and Banquet of the Wisconsin Valley Radio Association will be held Saturday, April 21 at the Youth Building, Wausau, Wis.

The event has been scheduled to start at 6 p.m. and tickets to the affair are available from Lawrence Lapinske, W9EWM, P.O. Box 179, Wausau. The tickets are $2.75 each. —30—

SIGNAL CORPS NEEDS MEN

THE U. S. Army Signal Corps wants to employ communications personnel for work in and near Washington, D. C. Specialists are needed for the Army Communication Center in the Pentagon, and for radio transmitting and receiving stations in nearby Virginia and Maryland.

Specialists needed include teletypewriter operators, on both manual and semi-automatic equipment; code clerks; teletypewriter mechanics; radio transmitter and receiver repairmen; power unit repairmen; and electronic engineers. Salaries range from $2650 to $5400 a year.

Further information on any of these positions may be obtained from the Civilian Personnel Branch, Office of the Chief Signal Officer, Room 2-C-280, The Pentagon, Washington 25, D. C. Information may be obtained by letter or by personal interview. —30—

SELENIUM RECTIFIERS and ASSOCIATED COMPONENTS

SINGLE PHASE

Full Wave Bridge

Input: 0-26 VAC Type No.	Current	Output: 0-20 VDC Net Price
C1B1	.750	$ 3.08
D1B1	1.5	4.00
E1B1	3.5	6.48
F1B1	6.0	8.64
G1B1	10.0	12.00
G1B2	20.0	22.40
G1B3	30.0	31.80
G1B4	40.0	40.00
G1B5	50.0	47.00
G1B6	60.0	54.00
G1B7	70.0	60.20

Input: 0-52 VAC Type No.	Current	Output: 0-40 Net Price
C2B1	.750	$ 5.84
D2B1	1.5	7.60
E2B1	3.5	12.38
F2B1	6.0	16.34
G2B1	10.0	22.40
G2B2	20.0	40.00
G2B3	30.0	54.00

Input: 0-130 VAC Type No.	Current	Output: 0-100 VDC Net Price
C5B1	.750	$12.60
D5B1	1.5	16.20
E5B1	3.5	26.46
F5B1	6.0	33.84
G5B1	10 0	47.00

Input: 0-156 VAC Type No.	Current	Output: 0-126 VDC Net Price
C6B1	.750	$14.16
D6B1	1.5	18.24
E6B1	3.5	30.02
F6B1	6.0	37.80
G6B1	10.0	54.00

Full Wave Center Tap

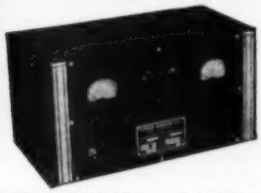
Input: 13-0-13 VAC Type No.	Current	Output: 0-9 VDC Net Price
F1C1	6.0	$ 4.50
G1C1	10.0	7.00
G1C2	20.0	12.00
G1C3	30.0	18.00
G1C4	40.0	22.40
G1C5	50.0	28.00

All ratings are maximum values for continous duty to resistive loads. For capacitive, battery charging, or inductive loads, reduce these ratings by 20%.

Powerstats

Smooth, efficient voltage control 0 to 135V. output from 115V. AC line.
Type 20 3 Amps. $12.50
Type 116U (illustrated) for panel mtg. 7.5 Amps ..... $ 18.00
Type 1126 15 Amps 46.00
Type 1156 45 Amps 118.00
Also available for 230 volt input. Write for descriptive literature.

POWER SUPPLIES



GENERAL PURPOSE low voltage DC power supplies, with variable outputs. Rugged—Dependable—Precision Control.

√ Features
√ Long life FULL WAVE SELENIUM RECTIFIERS
√ Output voltage continuously adjustable from zero to maximum
√ 3" Voltmeter and Ammeter—2% accuracy
√ Stepless control
√ 5-Way Binding Post
√ Instant Power—no warm-up period
√ Dimensions: 9x17 1/2x9"
√ Assembled and Ready to Operate
√ For 115 VAC 60 cycles

Write for descriptive bulletin GPA

Model	Voltage	Current
GPA810	0-8 VDC	10 Amps.
GPA1210	0-12 VDC	10 Amps.
GPA2810	0-28 VDC	10 Amps.

FILTER CAPACITORS

CF-1	1000 MFD	15 VDC
CF-2	2000 MFD	15 VDC
CF-7	3000 MFD	35 VDC
CF-19	500 MFD	50 VDC
CF-16	2000 MFD	50 VDC
CF-21	1200 MFD	90 VDC
CF-10	500 MFD	200 VDC

Mounting clamps for above Capacitors in stock

FILTER CHOKES

Type No.	Hy.	Amps. DC	Res.	Price
HYX6	.055	.600	2.0	$ 1.80
HY5A	.028	5.0	.2	6.30
HY10A	.014	10.0	.05	11.95
HY20A	.007	20.0	.02	16.75

TRANSFORMERS

All Primaries 115 VAC 60 Cycles

TXF36-2	36	2.0	6 lbs.	$ 5.95
TXF36-5	36	5.0	8 lbs.	7.80
TXF36-10	36	10.0	12 lbs.	11.95
TXF36-20	36	20.0	25 lbs.	21.54
XFC18-14	18VCT	14.0	10 lbs.	8.34
XFC18-50	18VCT	50.0	17 lbs.	22.74

All TXF Types are Tapped to deliver 32, 34, 36 Volts. XFC Types are tapped to deliver 16, 17, 18 Volts Center-tapped.

ATTENTION MANUFACTURERS!
Extend your DO rating to expedite delivery. We will do our very best to fill non-priority orders at the earliest possible date.

Minimum order $5.00
All prices are FOB our Factory and subject to change without notice. Send M.O. or check. ONLY shipping charges sent COD. Rated concerns send P.O., Terms Net 10 days.

Opad-Green COMPANY
71-3 WARREN ST., NEW YORK 7, N. Y. PHONE: BEekman 3-7385-6

DO YOU WANT TO STOP TOBACCO?

Banish the craving for tobacco as thousands have with Tobacco Redeemer. Write for free booklet telling of injurious effect of tobacco and of a treatment which has relieved many men.
In Business Since 1909
300,000 Satisfied Customers
THE NEWELL COMPANY
462 Clayton Sta., St. Louis 5, Mo.
FREE BOOK

read about "Experiments in Audio"
you'll find it in PF INDEX
FREE GET YOUR COPY FROM YOUR PARTS JOBBER

Prepare Now! RADIO ENGINEERING

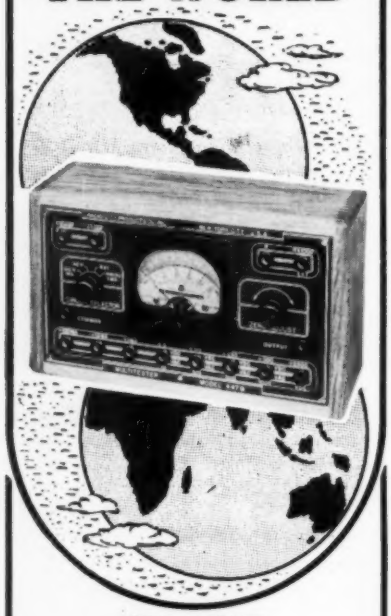
B.S. DEGREE IN 27 MONTHS

Complete Radio Engineering course incl. Telev., U.H.F., and F.M. BS Degree Courses also in Mech., Civil, Elect., Chem. and Aero Eng.; Bus. Adm., Acct. Extensive campus, modern buildings, well equipped labs. Low cost. Prep courses. Personalized instruction. Heavy demand for graduates. Placement service. Founded in 1884. Prepare now for the civil and military opportunities ahead.

VETERANS: You may still obtain training and a college degree at Tri-State College under present G.I. Bill. Last opportunity for new students to enroll is Summer Quarter, June 11, 1951. Hundreds of Tri-State veteran graduates are holding responsible positions with unlimited opportunities for future advancement.

Enter March, June, Sept., Jan. Write for Catalog.
TRI-STATE COLLEGE
1641 COLLEGE AVE. ANGOLA, INDIANA

more than
70,000
RCP
MULTITESTERS
MODEL 447B and prototypes
in use
ALL OVER
THE WORLD



$17.95 NET PRICE

SUCH POPULARITY
MUST BE DESERVED!

The exceptional value of the 447B Model is made possible by the tremendous quantities produced. The resulting very low price is responsible for its great popularity. These units are in a class with other makes of testers that sell for considerably more.

A 3" square D'Arsonval meter is used, having an accuracy of 2%. Accuracy of AC voltage measurements is improved by use of a new gold plated copper oxide rectifier.

RANGES

DC Voltmeter: 0-5-50-250-500-2500 Volts.
AC Voltmeter: 0-10-100-500-1000 Volts.
Output Voltmeter: 0-10-100-500-1000 Volts.
DC Milliammeter: 0-1-10-100-1000 M.A.
DC Ammeter: 0-1-10 Amperes.
Ohmmeter: 0-10,000 Ohms—1 Megohm—10 Megohms Ext.
Decibel Meter: —8 to + 55 decibels.

MODEL 447B — Open face, oak case. Size 5"x 8½"x3". Weight 21 oz. Complete with batteries. Net Price $17.95

MODEL 447BP—Portable, oak case with carrying handle, cover and test leads. Size 6½"x8½"x4½". Weight 24 oz. Complete with batteries. Net Price $21.95

KITS

NOW ALSO AVAILABLE IN KIT FORM the best professional test equipment made by RCP—precision equipment at the lowest prices ever. Each KIT contains simple step-by-step instructions.

MODEL 447BK—Open face, same as 447B but in kit form $13.95
MODEL 447BPK—Portable, same as 447BP but in kit form $16.95

Buy from your jobber. Insist on R.C.P. Instruments.
Write for Catalog RN-4

RADIO CITY PRODUCTS CO., INC.
152 West 25th Street New York 1 N Y

RADIO-TV Service Industry News

AS REPORTED BY THE

TELEVISION TECHNICIANS LECTURE BUREAU

National Defense Training

EVER since the end of World War II military spokesmen have loudly proclaimed that the next one—if it came—would be an electronic-atomic war which could be won or lost in a matter of months. With drawing board plans for extensive radar screens as a prime defense measure and a multitude of electronic devices like guided missiles as the core of the offensive plans for carrying the fight to the enemy, it has long been apparent that a veritable army of trained electronic technicians would be needed.

The present national emergency has been visible on the international political horizon for a long time. The government has spent untold millions of dollars for the work of "Planning Boards" that were supposed to have blue-printed national defense training programs that could be put into operation the minute a military emergency arose.

The service industry, the electronic manufacturing industry, and the armed services are all crying for skilled electronics technicians. But nowhere have we been able to ferret out any evidence of a studied plan to train the army of electronics technicians that, under certain conditions, could be required almost overnight.

Experience has proven time and again that it requires at least two years of training and experience for men with an aptitude for understanding these abstract forces that we term electronics, to become competent technicians on devices for which they are specifically trained—and much longer to reach a state of competence on a variety of electronics gear.

For more than six months our so-called planning boards have marked time on plans for the necessary extensive technician training programs waiting until manufacturing plans were completed and orders placed for the equipment. We presume then that this expensive electronic equipment will be produced and stacked up in warehouses or allowed to deteriorate under canvas in ordnance yards waiting for installation, maintenance, and the operating technicians to handle it.

Radio in Civilian Defense

Among the things we point to with great pride as an indication, or as proof, of the advanced state of our standard of living is the fact that there is practically no home in the country that does not have at least one radio receiver. And at any hour of any day or night in every community someone will be listening to some kind of a radio broadcast.

This almost universal use of radios provides us with a vitally important device for national civilian defense and protection—the ability to reach the entire populace with a message in a matter of minutes!

And the industry that has grown up to maintain these millions of radio receivers is, in itself, a phenomenon. The thousands of independent, small businesses that have come into existence to repair radios and to maintain associated mechanical and electronic equipment were not inspired by receiver manufacturers or their distributors. They came into being because the men who are these small businesses felt they could make a living working for themselves repairing radios.

The maintenance of the country's home radio receivers has been carried out so efficiently and unobtrusively that almost everyone takes continued radio set performance as a matter of course.

As a result, we hear no loud voice of protest when we read in a newspaper as influential as the *New York Times* that: "The electronics engineer or technician is one of the most sought after workers in the U.S. If TV is cut back, or if radio-TV manufacturers find government contracts to keep them going, *thousands* of self-employed servicemen will be feeding into aircraft plants."

Now suppose that such a statement were made about automobile repairmen quitting their jobs or closing up their repair shops to take jobs in manufacturing plants when the production of automobiles is curtailed. There would be a tremendous hue and cry. They would say that without an adequate supply of new cars to offset retirement from service through obsolescence it would take *more* mechanics to keep the old cars running. It would be pointed out that our privately owned automobiles give us national mobility—the ability to swiftly move the population from one area to another.

Perhaps no one would bother to say that panicky, frightened people traveling in automobiles without the voice of radio to guide, advise, and direct them would create mass havoc.

Radios deteriorate, too, and they need repairs. There is a smaller percentage of men who possess the aptitude for comprehending the abstract forces of radio than there is for mechanics. And it takes longer for technicians to reach the stage of competence in the maintenance of radio and electronic devices.

It is important right now to realistically appraise the national picture on maintenance facilities as it relates to radio receivers in the home. AM radio is still the "backbone" of our universal communications network. It would be interesting to know the *average age* of AM radios now in use in the homes. If this average age were known it is quite likely that it would shock most people to learn the tremendous potential maintenance job—because of the deterioration through aging—we face to keep these radios going if AM radio production is seriously curtailed or abandoned altogether.

Thousands of people are still using prewar radios for their AM listening. In the event of sudden military developments the bulk of these radios would be in almost constant operation.

They can break down. They can quit operating by the thousands. Deny the independent, self-employed technician adequate supplies of tubes and replacement parts; encourage him to close up shop and take a job in an airplane factory—and you undermine the maintenance foundation for this vast communications network made up of our home and automobile radios.

To a great extent, the failure of the independent service operators and technicians to form an effective national association may prove to be a serious disservice to the American public.

Business, trade, and professional organizations are formed for two major reasons. The first is for the protection of the members employed in a common activity and to encourage the improvement of the services performed by that activity. The second is that through their specialized knowledge of the work they do they can, by means of their national organization, protect users of the services they sell against thoughtless or selfish developments that are not in the best interest of the public. In other words, they are able to police their work for the benefit of the public.

If the radio-TV service industry possessed a strong, national voice today they could render a signal service to the public and the national defense effort by:

(1) Applying publicity pressure on defense officials to step up action on technician training programs to supply trained men for national defense and to stop the rapid depletion of the skilled technicians in the independent servicing industry, and,

NOW! BECOME EXPERT AT

Radio-Television

IN 4 EASY STEPS!

Complete Self-Training Course in RADIO and TELEVISION Prepared by Famous Experts—Starts from Scratch, Takes You BY SIMPLE LOGICAL STEPS from Basic Theory to Advanced Problems of Repair, Installation, Color TV, etc.

NOW you can do ANY Radio-TV installation, service, or repair job like an expert; operate field-testing equipment; understand problems of TV broadcasting, FM-AM transmission, etc. You can step into a good-paying job—or start your own service business. And you can train yourself for your career AT HOME . . . IN YOUR SPARE TIME . . . with the McGraw-Hill Basic Course in Radio and TV.

2296 Pages—1611 Illustrations

The men who wrote this complete 4-volume course are among the outstanding radio and TV instructors in America today. They are practical, shirt-sleeved technicians. They know the questions you want answered. Every detail is clearly explained in over TWO THOUSAND PAGES of step-by-step instruction and over SIXTEEN HUNDRED "how-to-do-it" illustrations, cross-section diagrams, etc. The review questions and answers "nail down" everything you learn. At-a-glance "trouble-shooting" charts show how to diagnose instantly any radio or TV breakdown . . . and how to repair it expertly and quickly.

The course will pay for itself many times over. It can qualify a beginner for FCC's 1st-Class License test; gives an experienced technician more confidence, shows him new tricks.

SEND NO MONEY

Mail coupon below to examine this complete four-volume course FREE for 10 days. No obligation. WITH course, you get ABSOLUTELY FREE (to keep whether or not you keep course) a valuable illustrated book, "Successful Soldering." (reg. price: $2.00.)

Or you may examine individual books FREE for 10 days by checking the proper boxes in coupon. Don't delay. Mail coupon at once!

PARTIAL CONTENTS

ESSENTIALS OF RADIO, 800 pages, 433 illus.

Circuit Analysis • Vacuum Tubes • Circuits: Detector, Amplifier, Tube Oscillator, Power Supply, Transmitting and Receiving • Test Equipment.

ELEMENTS OF RADIO SERVICING, 475 pages, 375 illus.

Multimeters • AC Power Supply • Speakers • Antennas • Automobile Radios • Push-Pull Output Stage

BASIC TELEVISION, 592 pages, 415 illus.

Scanning • Synchronizing • Video Signal • Brightness Control • D-C Reinsertion • Picture • FM Alignment • Picture Tubes • VHF and UHF transmission • Reception.

TELEVISION SERVICING, 429 pages, 388 illus.

Antennas • Transmission Lines • Test-pattern and Picture Analysis • Localizing Reception Troubles • Interference Remedies • Deflection Circuits.

ABSOLUTELY FREE

(whether or not you keep course) "Successful Soldering" (reg. price: $2)

Covers EVERY soldering job: ALL types of metals and solders: black iron, zinc, tin, stainless steel, copper, aluminum, pewter, lead, etc. Gives heating methods. Dozens of "how-to-do-it" pictures and diagrams.

FREE 10-DAY TRIAL COUPON

McGRAW-HILL BOOK CO., Inc., Dept. RTN-4, 327 West 41st St., New York 18, N. Y.

Please send me for 10 days' FREE EXAMINATION,
☐ **McGRAW-HILL'S Basic Course in Radio & TV . . .** including **Essentials of Radio, Elements of Radio Servicing, Basic Television, Television Servicing** (Total retail price of the four books is $225.50—Special Course Price: Only $19.95 in easy installments). Also send ABSOLUTELY FREE, "Successful Soldering." If not satisfied with course, I will return the four course books; pay nothing; and keep "Successful Soldering" free. Otherwise, I will send you only $1.95 plus postage **then**; and the balance in 6 monthly installments of only $3.00 each.

If you wish to examine any of these books individually, check below the ones you wish us to send you for 10 Days' FREE EXAMINATION:

☐ **Essentials of Radio, $6.00** ☐ **Elements of Radio Servicing, $4.50**
☐ **Basic Television, $6.50** ☐ **Television Servicing, $5.50**

For whichever of these books I decide to keep, I will send you $2.00, plus postage, at the end of 10 days; balance in easy monthly installments.

Name .....
Address .....
City ..... State .....
RTN-4

☐ **WE'LL PAY POSTAGE** if you enclose first payment of $1.95 when ordering the course, or the full price of book when ordering individual books (see prices above). Same 10-Day Return Privilege for full refund.

RADIO COURSES

• RADIO OPERATING • CODE
• RADIO SERVICING • ELECTRONICS
• F.M. TELEVISION
• PREPARATION FOR CIVILIAN, MARITIME, ARMY AND NAVY LICENSE REQUIREMENTS.
Write for Catalog T.S.

YMCA
TRADE & TECH. SCHOOL 229 W. 66 St., N. Y. 23 ENdicott 2-8117

No Experience Needed To
PRINT YOUR OWN POST CARDS

The GEM STENCIL DUPLICATOR saves money . . . gets results quickly! Hundreds of uses for every type of business and organization. We ship the GEM complete with all supplies, Guide Board for accurate printing and 60-page Book of Ideas at the special low price of only **$8.50** (a $15.00 value)

Our 21st Year

FREE TRIAL OFFER

Use the GEM **FREE** at our expense! SEND NO MONEY. Write and complete GEM outfit will be sent you postpaid. After ten days, send us only **$8.50** or return the GEM. You must be satisfied! WRITE TODAY.

BOND EQUIPMENT CO. Dept. 52
6633 Enright • St. Louis 5, Mo.

QUALITY AUDIO EQUIPMENT FOR EVERY BUDGET
COME IN AND SEE BEN PINZ FOR SOUND ADVICE — NO OBLIGATION
HARRISON'S
Sound Shop
HARRISON RADIO CORP.
225 Greenwich St • N.Y.C. • BA 7-7777

ALTEC

amplifiers

... perform

... and perform

... and perform

...without failure!

Especially now, when material shortages may make replacement parts impossible to find, dependable Altec quality pays extra dividends. Equipment failures can mean the loss of thousands of dollars. Altec superiority, in engineering, large safety factors, conservative ratings and the use of quality components, is the best possible insurance against these costly breakdowns. Invest wisely. Buy the amplifiers that give the greatest value. Buy Altec amplifiers. They perform... and perform... and perform.

9356 Santa Monica Blvd., Beverly Hills, Calif.

161 Sixth Avenue, New York 13, New York

ALTEC LANSING CORPORATION

(2) By the same method insure the supply of adequate stocks of tubes and replacement parts to maintain home and automobile receivers.

Association News Briefs

Albert M. Haas was re-elected president of the Television Contractors Association of Philadelphia. Mr. Haas has served as president of this Association since its inception. TCA also re-elected Samuel A. Whittingham, vice-president, and Jack Phillips, secretary. Joseph F. Griffin was elected to the position of treasurer, replacing George F. Weber.

Frank J. Moch was re-elected president of the Television Installation Service Association of Chicago for his fourth consecutive term.

In an editorial in a recent issue of *ARSNY News*, Max Liebowitz, president of the Associated Radio-Television Servicemen of New York, emphasized the position of the New York State Federation with respect to the kind of a national organization they would support. Mr. Liebowitz pointed out that the "Empire State Federation of Electronic Technicians Association has recognized from its very inception the tremendous importance of an *effective* and *representative* national association, and its every effort has been directed toward the formation of such a group.

"The organization of individuals as independent as radio technicians must be on a local basis. Then, if a larger geographical group is desired, representatives from these local groups can organize into a unit such as a statewide organization. Finally, representatives from these state organizations may then move in the direction of their ultimate goal, a national organization."

The *ARSD News* arrived just in time to bring us up-to-date on the dynamic activities of the Associated Radio Service Dealers of Columbus, Ohio. This group is noted for its forward-looking programs and several years ago inspired the planning that is now crystalizing in the Bureau's package program series. J. P. Graham is back at his typewriter as editor of the *News* and the current issue is typical of his rapid, breezy coverage of the many monthly events that keep the Association's members interested in their organization. Officers elected for the current year are Charles Dykes, president; Fred Colton, vice-president; Don Blazer, secretary, and John Graham, treasurer.

Bureau Adds New Service

The Lecture Bureau is adding a new service in its expanding program of technical and business lectures for radio and television service operators and technicians. This new service will provide a complete 90 minute service meeting "package" that will enable service association officers and program chairmen to put on professionally-prepared monthly programs for their members without losing a lot of time.

ALMO SPOTLIGHT SPECIAL

WILCOX-GAY RECORDETTE-3

3-WAY, 3-SPEED RECORDER-RADIO PHONO-PORTABLE

YOUR COST $65.75

• Plays LP, 45, and standard records. Makes perfect demonstrator for record department. Built for heavy duty and extra fine reproduction.

• Your record customers will like the Recordette-3. Plays and records all three speeds. Has quality superhet radio. Extremely light; weighs only 18 pounds.

10% Cash with Orders.

ALMO RADIO CO.

509 ARCH STREET • Philadelphia
6205 MARKET STREET • West Phila.
6th & ORANGE STS. • Wilmington
4401 VENTNOR AVE. • Atlantic City

LEARN DAY and EVENING CLASSES TELEVISION

ELECTRONICS-RADIO

Modern Laboratory Instruction in

- SERVICING
- BROADCAST OPERATING
- ELECTRONIC and TV ENGINEERING

G.I. APPROVED

WRITE FOR ILLUSTRATED CATALOG

ELECTRONICS INSTITUTE, Inc.

21 HENRY, DETROIT 1, MICH.

300 OHM 7 STRAND

TELEVISION LEAD-IN WIRE

High quality, seven-strand, copper wire, covered with *Pure Black Polyethylene* . . . 55 mil. Immediate delivery.

Quantity priced on request. F.O.B. Baltimore. 20% deposit. Balance C.O.D. $27.95 Per 1000-foot coil

D & H DIST. CO. INC.

25 S. Liberty St. Baltimore, Md.

CONDENSERS

OUR SPECIALTY

OIL FILLED TYPES

All Values and Voltage Ratings
We Invite Your Inquiries

TECHNICAL RADIO PARTS CO.

557 McDonald Ave., Brooklyn 18, N. Y.

ANOTHER OUTSTANDING JOBBER

RADIO SUPPLY of MUNCIE, Inc.

305 North Madison St.
Muncie, Indiana

$44.95

HAS THE SENSATIONAL NEW EICO 425-K 5" SCOPE KIT IN STOCK!

The heart of these "packaged" monthly service meetings will be a sound-slide film illustrated-recorded lecture on some currently important installation, maintenance, service, or business subject that is of immediate interest to members of the service industry.

This program will be ready for scheduling for the month of September to start the Fall meetings of the Associations that apply for it. The method used to "localize" the subject material has been developed by the Bureau from its experiences during the past three years in conducting service meetings in almost every State in the Union. Long needed by organized service groups whose officers are always hard-pressed for time to handle all of the details involved in planning and preparing interesting monthly programs for their members, this plan will provide for a series of six intensely interesting, professionally arranged meetings that will keep association members' interest at a high level throughout the entire 1951-52 season.

The Bureau will furnish these complete programs to accredited Associations without charge. In order to qualify for participation in this lecture-program series and to enable the Bureau to co-ordinate meeting dates, radio and television association officers and interested groups of non-organized service operators and technicians who want to study various phases of the technical and business operating problems of the service activity together—should write immediately for complete information on the plan and for a copy of the participation form.

Non-organized groups of service shop operators and technicians numbering ten or more people per group may schedule this entire series provided they select one member of the group who will assume responsibility for the equipment and lecture material which will be loaned to them.

It will be necessary to be accredited by July 1st to qualify for the September program so it will be advisable for interested groups to write for information immediately.

Address your inquiry to Service News Editor, RADIO & TELEVISION NEWS, 185 North Wabash Ave., Chicago 1, Ill.

The Pennsylvania State Federation of Radio Service Associations has accepted the Bureau's offer to conduct the first series of meetings using the "package" program.

During the month of March this program was used by seven of the Associations affiliated with the State Federation. The program was presented in Philadelphia, Harrisburg, Reading, York, Williamsport, Scranton, and Wilkes-Barre.

The Empire State Federation of Electronics Technicians Associations have scheduled this first "package" program for their affiliated organizations during the month of April after which it will be given by key Associations in many parts of the country.

-30-

MICHAEL FARADAY

Discoverer of magnetic-electric induction. Inventor of electrical generator. From his name comes the measure of a capacitor—farad.

Famous for Firsts

You can look to Ward for the "last word" in antenna design.

Today's commonly accepted design features—such as nylon insulators, matching phasing links for maximum energy transfer, true broad band response and minute-man quick installation—are all Ward firsts!

Ward aerials are the result of over twenty years of design and production experience. Ward, the oldest and largest exclusive manufacturer, builds the world's finest antennas.

WARD
WORLD'S LEADING EXCLUSIVE MANUFACTURER OF
ANTENNAS

THE WARD PRODUCTS CORP.
Division of The Gabriel Co.
1523 East 45th St., Cleveland 3, Ohio

PEN-OSCIL-LITE

Extremely convenient test oscillator for all radio servicing; alignment • Small as a pen • Self powered • Range from 700 cycles audio to over 600 megacycles u.h.f. • Output from zero to 125 v. • Low in cost • Used by Signal Corps • Write for information.

GENERAL TEST EQUIPMENT
38 Argyle Buffalo 22, N. Y.

4-CHANNEL E.C.O.

Channel 1 1050-1700 KC | Channel 3 3000-4800 KC
Channel 2 2000-3400 KC | Channel 4 4370-7000 KC

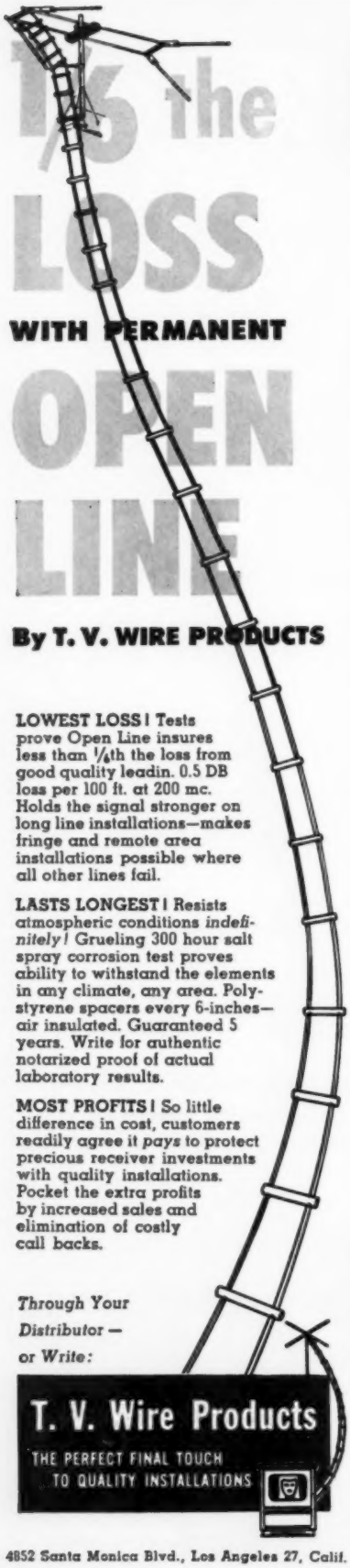
Unit is the front end of the TA-12D aircraft transmitter add an 807 intermediate power amplifier and 2 807 for power amplifier you have a 50 watt transmitter, each channel is complete with 12SK7 tube is a complete oscillator with variable condensers, etc., each channel shielded all mounted on one chassis ready to add voltage.

BRAND NEW ORIGINAL BENDIX PACK, $9.95 EACH
McCONNELL'S 3834 Germantown Ave. Phila., Penna. RA 5-6033

RADIO ENGINEERING
TELEVISION
ELECTRONICS

Thorough training in all phases of radio and electronics, open to high school and junior college graduates. Old established school specializing in Radio training exclusively. Modern laboratories and courses. Enrollments limited. Approved veteran training.

VALPARAISO TECHNICAL INSTITUTE
Dept. RD Valparaiso, Ind.



1/6 the LOSS WITH PERMANENT OPEN LINE

By T. V. WIRE PRODUCTS

LOWEST LOSS! Tests prove Open Line insures less than 1/6th the loss from good quality leadin. 0.5 DB loss per 100 ft. at 200 mc. Holds the signal stronger on long line installations—makes fringe and remote area installations possible where all other lines fail.

LASTS LONGEST! Resists atmospheric conditions *indefinitely!* Grueling 300 hour salt spray corrosion test proves ability to withstand the elements in any climate, any area. Polystyrene spacers every 6-inches—air insulated. Guaranteed 5 years. Write for authentic notarized proof of actual laboratory results.

MOST PROFITS! So little difference in cost, customers readily agree it *pays* to protect precious receiver investments with quality installations. Pocket the extra profits by increased sales and elimination of costly call backs.

Through Your Distributor —
or Write:

T. V. Wire Products
THE PERFECT FINAL TOUCH TO QUALITY INSTALLATIONS

4852 Santa Monica Blvd., Los Angeles 27, Calif.

AFCA NEWS

This Association is a patriotic non-profit organization, with chapters in most of the larger cities, dedicated to developing and maintaining efficient personnel, commissioned, enlisted, civilian, for the supply (including design and development), installation, maintenance, and operation of communications and electronic equipment for Army, Navy, and Air Force and their supporting civilian activities. It publishes a magazine "SIGNALS" at its national headquarters in Washington. Every American interested in any way in communications is eligible and invited to join. Dues are $5.00 per year. Application should be submitted to the secretary at 1624 Eye St., N. W., Washington 6, D. C., who will furnish details upon request.

Annual Convention

Technical forums in communications, electronics, and photography will highlight AFCA's fifth annual convention to be held in Chicago on April 19th and 20th at the Drake Hotel.

Nationally known industrial leaders will conduct the discussions pertaining to military and civilian defense and production. They will formulate plans for a closer coordination between military and civilian requirements.

Current problems of communications will be stressed by Leslie F. Muter, past president of the Radio Manufacturers Association, in the keynote address of the convention on April 19th.

Detailed discussion by industries will be conducted in forum meetings by nationally known leaders in the fields of land-lines and radio communications, and photography. Heading the "land-line" forum will be James H. Kellogg, president of the *Kellogg Switchboard and Supply Company*. William J. Halligan, Sr., president of the *Hallicrafters Company*, and an AFCA national director, will conduct the panel on radio communications. William C. DeVry, president of *DeVry Corporation*, will lead the discussion on photography.

Visitors to the convention will be accorded the privilege of a personal tour through Midwestern industrial plants producing vital communications, electronics, and photographic equipment.

Climax of the convention will be the annual banquet Friday evening, April 20th, attended by civilian and military leaders who will hear an address by Robert C. Sprague, chairman of the board of the Radio-Television Manufacturers Association, who will chart the course for the communication industry in the days ahead.

AFCA CHAPTER NEWS

Augusta-Camp Gordon

Dr. J. O. Perrine, assistant vice-president of the *American Telephone and Telegraph Company*, presented his demonstration-lecture "More Words—More Waves—Less Wires" before the Augusta-Camp Gordon Chapter's January 10th meeting.

Prior to Dr. Perrine's lecture, chapter members attended a dinner-meeting at the Camp Gordon Officers' Club. Guests included Brig. General and Mrs. Halley G. Maddox, commanding general, Camp Gordon; Colonel James H. Howe, chief of staff, Camp Gordon; Colonel Francis E. Howard, commandant, Provost Marshal General School, Camp Gordon; W. H. Mansfield and R. Grist of the *Southern Bell Telephone and Telegraph Company* of Atlanta.

More than six hundred persons attended the lecture as guests.

Baltimore

On January 18th, Dr. Perrine appeared in Baltimore under the joint sponsorship of the AFCA Baltimore Chapter and the Engineers Club of Baltimore and its affiliated societies. The meeting was held at the Maryland Casualty Auditorium and drew an audience of some 1700 persons.

In his opening remarks, Dr. Perrine likened the engineer to "energy" and concluded his theorizing with the development and derivation of the term "imagineering" as applied to those individuals engaged in engineering and research who are interested in the development of new ideas and gadgets for increased production.

Dr. Perrine, in layman's language, described the equipment used in his demonstration, namely, the signal generator, the oscilloscope, transmitters, and receivers, and showed how each played its part in the transmitting of conversations between locations via wire and radio. The voice frequencies were described and compared with the tone frequencies occurring in a symphony. By viewing the wave patterns on the oscilloscope, it was clearly shown that vowel wave patterns differ with each individual while consonant sounds give the same wave pattern regardless of how many different individuals speak them.

The next phase of the demonstration was the superimposition of modulated waves on carrier signals. First, each of four different conversations were fed through the wires and heard at the other end. Then the four conversations were fed together and the jumbled conversations heard on the other end. By use of the r.f. signal generator, four carrier signals were transmitted and each viewed on the oscilloscope, emphasis being placed on the sine wave effect. Then, one at a time, a modulated wave was superimposed on the carrier signal and transmitted. After all four conversations were combined

with each of the four carrier signals, they were viewed and heard. Following this, all four modulated carrier waves were transmitted and heard at the other end. And then, one by one, the carrier signals were removed leaving the original conversation.

The demonstration was highly interesting and could be readily understood by those in attendance. Dr. Perrine further elaborated on the transmission of hundreds of signals over a single pair of wires in the manner he had so aptly demonstrated.

Chicago

The Chicago Chapter's January meeting was held at the *Coyne Electrical and Radio-Television School*, 500 South Paulina Street, Chicago. More than seventy members gathered for dinner at the nearby Medical Center YMCA where special catering had been arranged. After dinner, the group reconvened at one of the *Coyne* lecture halls for the evening program, followed by a tour of the *Coyne School* while it was in session.

Chapter President Oliver Read opened the meeting with a report on plans for the association's annual convention being held in Chicago on April 19th and 20th.

Raymond K. Fried, Chicago Chapter secretary and legal consultant on procurement, was asked to give the members a brief resumé of his recent experiences with the procurement and industrial mobilization offices in Philadelphia. Col. Fried advised the members representing small business and new business that patience in seeking government business would probably be rewarded by April or May, with contracts for those who convert to military production. The services and agencies are going forward with plans that naturally make first use of the known government suppliers of World War II who have been willing and able to maintain paid staffs specializing in maintaining and developing government supplies in the fields of communications and photography. Fried advised members interested in manufacture for the Signal Corps that Philadelphia is the location where contract details must be worked out, and not in Washington.

President Read next introduced the principal speaker of the evening, Mr. D. B. Miller, educational director of *Coyne School*, who spoke on "The Value of Technical Training in the Armed Forces." Mr. Miller sketched the rapid growth of technical skills required in the armed services, starting with the relatively modest requirements of World War I days, when the telephone, wireless telegraphy, automobile, and aircraft were just beginning to become significant parts of the military machine. He cited some of the problems of World War II, when service schools were rapidly expanded to train men for technical assignments in aviation, radio, and radar, and it was found necessary to call on public and private schools to supplement the technical training facilities.

LOW, LOW CHELSEA PRICES FOR HIGH, HIGH QUALITY TV

for 17" Rectangular Tube LESS C R T
$132.90
Including Fed. Exc. Tax

for 20" Rectangular—or 19" Round (Specify) LESS C R T
$143.40
Including Fed. Exc. Tax

ALSO AVAILABLE 630 TYPE CHASSIS

A SET NOT A KIT
18¾" Wide
17¼" Deep

FAMOUS C-4 CHASSIS
Latest 1951 Features
Completely Wired
Superpowered with Noise-Limiter Circuit. Factory-Engineered, Aligned, Tested.
Improved AFC—Keyed AGC
Latest Single-Knob Control
19 Tubes—13K Anode Voltage
Front End down to 45 Microvolts.
Phono Jack Switch
Fine Reception—even on indoor antenna—in most areas.

FULL RMA GUARANTEE—FREE CHELSEA WARRANTY
Just Plug It In—and IT WORKS!

Guaranteed PICTURE TUBES Factory-Fresh
In sealed cartons (prices include Fed. Exc. Tax)

16" Round	16" Rectangular	17" Rectangular	19" Round 20" Rect.
$40.65	$42.85	$43.95	$71.45

First Quality—VITAL COMPONENTS—Precision Tested
(Prices include Federal Excise Taxes)

Item Number		Price
4-1	4.5 MC Ratio Det. Trans	$1.05
4-2	4.5 MC Sound Take Off Trans.	.86
4-3	Audio O.P. Trans. 6V6 to 3.2 ohm	.77
4-4	Hor. O.P. Trans. HI EFF—similar to Gen. Electric Type 77 J1	3.93
4-5	Vert. O.P. Trans. Turns Ratio 10:1 Primary 1300 ohm—Sec. 9.7 ohm	1.55
4-6	Power Trans. 405 VDC-180 MA CT red-yellow. 6.3 V AC—6.15 A green . . . 6.3 V AC—1.2 A brown . . . 6.3 V AC—1.2 A slate . . . 5 V AC—3 A yellow	7.29
4-7	Vert. Block Osc. Trans.—Turns Ratio 1:4.2 Primary 165 ohm. Sec. 1000 ohm	.90
4-8	40 Mfd 450 V Cond	.79
4-9	100 Mfd 25 V Cond	.59
4-10	4 Mfd 25 V Cond	.41

Item Number		Price
4-11	Filter Choke 2H 190 MA 60 ohm	$1.05
4-12	Filament Choke .9 ohm	1.07
4-13	Hor. Osc. Coil 20-40 MHY variable	.54
4-14	Width Coil 54-245 ohm variable	.38
4-15	Linearity Coil 5.5-20 MHY variable	.43
4-16	Focus Coil 356 ohm 200 MA 70°	3.93
4-17	Speaker—5" 3.2 ohm	1.35
4-18	Speaker—8" 3.2 ohm	2.70
4-19	Ion Trap—single magnet	.32
4-20	Phono Switch DPDT	.38
4-21	Interlock TV line cord for popular makes	.29
4-22	High Voltage Ceramicons—500 mfd-20 KV	.69
4-23	Focalizer for all type tubes	2.49
4-24	Deflection Yoke—wire iron ferrite 70° 13.8 MH	3.95

HOW TO ORDER: Phone and mail orders for chassis and tubes filled on receipt of Certified Check or M.O. for $25 as deposit, balance C.O.D., F.O.B., N. Y. In ordering Components, specify Item No. and quantity. Send 25% deposit with order, balance C.O.D., F.O.B., N. Y., plus postage. ($1.00 handling charge for orders less than $5.00.) In N. Y. C. add 2% Sales Tax. Discount for volume orders. All items subject to prior sale—or to change of price—without notice.

The House of Bargains

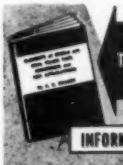
CHELSEA TELEVISION CENTER, INC.

130 West 42nd Street, New York 18, N. Y. LOngacre 5-2254-5-6

RADIO ENGINEERING DEGREE IN 27 MONTHS

Radio engineering is a big field. There's room for you in it—if you're good. Get first-class training at Indiana Tech. Intensive specialized course, including strong basis in mathematics and electrical engineering, advanced radio theory and design, television. Modern laboratory. Low tuition. Also 27-month courses in Aeronautical, Chemical, Civil, Electrical and Mechanical Engineering. Approved for G.I.'s. Enter June, September, December, March. You can earn part of your expenses right here in Fort Wayne while you are studying.

INDIANA TECHNICAL COLLEGE
941 E. Washington Blvd., Fort Wayne 2, Indiana
Please send me free information on B.S. Engineering Degree in 27 months as checked.
☐ Radio-Television ☐ Aeronautical ☐ Civil ☐ Mechanical ☐ Electrical
Name .....
Address .....



SENSATIONAL NEW BOOK
ELEMENTS of SINGLE and DUAL TRACK MAGNETIC TAPE RECORDING and 1001 APPLICATIONS
by A. C. Shaney
INFORMATIVE! INSTRUCTIVE! INTERESTING!
The book that brings you up-to-date on tape recording. Complete history, theory, design and uses. 144 pages of FACTS!
ONLY $1.00 POSTPAID
Order today. Remit with order, please. Booklet mailed same day.
AMPLIFIER CORP. of AMERICA
398-2 Broadway, New York 13, N. Y.

Still Available at HARVEY'S

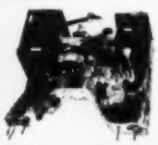
WILLIAMSON HR-15 AMPLIFIER

The famous Williamson HR-15 amplifier circuit . . . now available with the original Partridge transformers built to Williamson's specifications. Build this kit in 3 hours or less, and enjoy sound of a quality you never heard before. The HR-15 is a 2-Chassis power amplifier for use with tuners or other front ends having own volume and tone controls. All American triodes, 2-6SN76GTY, 2-807, or 6BG6G in PP output, 5V4G rectifier. Response ± .5 db, 10-100,000 cycles. Output impedances 1.7 to 109 ohms in 8 steps. Absolute gain 70.8 db. 20 db. of feedback around 4 stages and the output transformers. Kit is Complete with Tubes, Punched Chassis, Pre-wired Resistor Board, Sockets, Genuine Partridge Output Transformer, and All Necessary Parts..... $75.00

PARTRIDGE OUTPUT TRANSFORMER, as used in above Kit, available separately $22.50

Model 515S1—RCA 15" Duo-Cone Speaker

High fidelity speaker with "built-in crossover," no network needed, minimum crossover interference. Can handle up to 25 watts power. Has dual voice coils driving dual cones, with crossover frequency at about 2000 cycles, at which point the duo-cones vibrate as a single unit. Alnico V magnet $36.30



TECHMASTER

America's Finest TV Chassis

Made by Techmaster Products Co. 630 circuit RCA licensed. For all size Kinescopes, round or rectangular. Full-rated high voltage ...improved AGC...advanced turret 12-channel tuner...molded tubular condensers...perfect linearity...four tube split sound circuit...full 4 Mc bandwidth . . . hi-fidelity FM TV sound.

Will accommodate all tubes, glass or metal —round or rectangular—from 10" to 20" size $189.50

Same Chassis with Turret or Dumont Tuner and Push-Pull Audio $199.50

Above Prices are Complete with 12" Speaker and all tubes, less Kine.

16" Round Tube $39.35
17" Rectangular Tube $39.35
19" Round or 20" Rectangular Tube $66.50

RCA 201-E1 (KRK-2) FRONT END TV TUNER — as used in the RCA 630 chassis. Brand new, and complete with tubes ..... $ 18.50

G.E. #77J1—High Voltage Transformer, 14,000 volts output. TODD #70W85—70° Yoke. Specially Priced. Both for only..... $ 10.95

Prices Subject To Change Without Notice

Telephone: LUxemburg 2-1500

hrc

HARVEY RADIO COMPANY INC.

103 West 43rd St., New York 18, N. Y.

Mr. Miller stated that while the number of trained technicians now serving in the armed services is withheld from publication for reasons of military policy, it is known that the total already exceeds that of the peak period of World War II. The trend of modern warfare, in Korea and at outposts in 16 other foreign countries, places increasing dependence on the installation, maintenance, and repair of electrical communications equipment in greater volume than ever before. A large part of *Coyne's* problem in World War II and in the present situation is to train men in the fundamentals of electricity, land-line and radio communications who will then be available for the specialized training of the armed services.

Mr. Miller outlined the pattern of training at *Coyne,* comprising about fifty per-cent classroom instruction and fifty per-cent shop work. Classroom instruction consists of lectures, demonstrations, discussion periods, and the use of visual aids, cut-away models, and manuals of work to be completed under the guidance of instructors. In the visual aid category are slide films, with and without sound, and an estimated seven miles of sound motion picture film subjects. The shop work is done on real equipment, supplemented with specially constructed training aids. The students become familiar with all forms of electrical devices and actually construct, operate, and trouble-shoot radio and television receivers and radio transmitters. Mr. Miller concluded his talk by showing a sound slide film of industrial applications of electronics, designed to acquaint the student with the varied possibilities in that field.

After the tour, the chapter members gathered in a lecture theater to view a timely U. S. Army Signal Corps film, "Guarding Against Sabotage," made available through the courtesy of the Signal Officer, Fifth Army.

Detroit

A complete coverage of the color TV question was presented to the February 2nd meeting of the Greater Detroit Chapter by Mr. Oscar Kusisto, prominent radio and television engineer from *Motorola Inc.* His talk included a description and evaluation of the various color systems, the possibility of converting present sets for color reception, and the economic factors influencing the question.

The meeting, held at the Veterans Memorial Building, was presided over by Chapter President E. C. Balch, chief engineer of the *Michigan Bell Telephone Company,* and was attended by one hundred chapter members and guests.

The program concluded with the showing of two Signal Corps films covering the Korean situation through October 1950—"Battle for Time" and "Turning of the Tide."

Philadelphia

More than twenty members of the AFCA Philadelphia Chapter participated in the highly publicized mock air

SCARCE TV PARTS!

Lots of Hard-to-Find Items

- Famous Telekit TV Kits from $49.50 up, complete with all parts, wire and instruction book.
- Scarce TV Tubes
- Resistors
- Condensers
- Chokes and Coils
- Transformers
- TV Cabinets, Antennas, Boosters
- Hundreds of others!

We are balancing out our inventory! Write or wire us about your needs.

ELECTRO-TECHNICAL INDUSTRIES
1432 N. Broad St. Philadelphia 21, Pa.

BETTER TV RECEPTION

THE "Fringe Area TV" Reference Book

TV signal propagation, evaluation of TV antenna, making a TV signal survey, types of masts and towers and recommended installation practices. Full data on rhombics, how to use open-wire feed line, how to eliminate ghosts, minimizing fading, TVI, etc.

By W. W. Smith and R. L. Dawley

$2.50 PER COPY — By mail, $2.60 postpaid

AT YOUR FAVORITE DEALER OR DIRECT BY MAIL FROM Editors and Engineers LIMITED 1317 KENWOOD ROAD, SANTA BARBARA, CALIFORNIA

ON-THE SPOT BATTERY RECORDER

WALKIE-RECORDALL 8 lb. miniature BATTERY RECORDER-PLAYBACK

Continuous, permanent, accurate, indexed recording at only 5c per hr. Instantaneous, permanent playback. Picks up sound up to 60 ft. Records conferences, lectures, dictation, 2-way phone & sales talks; while walking, riding or flying. Records in closed briefcase with "hidden mike"! Write for Detailed Literature.

MILES REPRODUCER CO., INC.
812 BROADWAY Dept RN-5 NEW YORK 3, N. Y.

RADIO and TELEVISION

Thorough Training in All Technical Phases
APPROVED FOR VETERANS
WEEKLY RATES DAYS—EVENINGS
FREE PLACEMENT SERVICE FOR GRADUATES
For Free Catalog write Dept. RN-51
RCA INSTITUTES, INC.
A Service of Radio Corporation of America
350 West 4th St., New York 14, N. Y.

Very little space is required to say:

"TELEPLEX TEACHES THE CODE"

But how it teaches it! The advantages of TELEPLEX, fundamental principles that you must know, is a long story. Get the facts and compare. A postal card will bring you "Some Pertinent Facts About Code."

TELEPLEX CO., 804 E. Dawn Drive, Modesto, Calif.
(See it at Blan's, 64 Dey Street, New York)

IF IT'S GOOD SOUND EQUIPMENT SEE and HEAR it at . . .

HARRISON'S Sound Shop

SOUND ADVICE — NO OBLIGATION • See BEN PINZ
HARRISON RADIO CORP.
225 Greenwich St. • N. Y. C. • BA 7-7777

raid on Camden, N. J., on January 11th.

The communications aspect of the raid was most efficiently handled. In contact by radio with twenty planes, nearly one hundred automobiles, two ambulances, and even a pack job, the communications plan called for the complete disruption of telephones and radio as a result of the bomb explosion. While the emergency net was put into operation (it took less than five minutes), the exact location of the bomb hit was relayed to the communications center by Boy and Sea Scout wig-waggers. Temporary telephone lines from the fourth floor desk of the city director permitted over-all control through the mobile control center on the ground.

Chief credit for the exemplary work of the two hundred persons serving communications is due to Col. Robert Pearson, an AFCA member, who heads up the Philadelphia Chapter's committee on Camden's Communications Civil Defense.

San Francisco

Captain A. L. Becker, commander of the San Francisco Naval Shipyard, was the principal speaker at the chapter's February 1st meeting, held at the Officers' Club of the San Francisco Naval Shipyards.

With "Communications—Weapon for Defense" as his subject, Captain Becker stressed the need for new and faster methods of communication in order to safeguard American defenses, as without communications there would be no defense. He cited the need for the expansion of coaxial cable facilities in order to relieve the shortage of copper now going into numerous wire and cable lines. He also stressed the need for long range television and facsimile equipment, as well as better undersea communications.

Prior to the dinner-meeting, the AFCA members were conducted on a tour of the shipyard by W. R. Pengro, public relations officer of the San Francisco Naval Shipyard. The tour included a trip through a submarine and a close-up view of most of the ships under construction or being recommissioned.

Seattle

Plans for programs at future meetings were formulated at the Seattle Chapter's January 10th meeting at the Chamber of Commerce Building. Demonstrations and lectures on new developments in the communications field will be emphasized. A local representative of the *General Electric Company* advised that a demonstration of an electronic selector system would be made available for the chapter's June meeting.

The advantages of membership in the AFCA were pointed out to the various guests present by Chapter President Marshall B. James and Membership Chairman Frank D. Keyser.

An interesting and informative *Pan American Airways* film on the "Clipper" planes concluded the evening's program. —30—

SEE LEO FIRST FOR....

hallicrafters!

I can SAVE you money...Liberal Trade-ins

HALLICRAFTERS S-77 RECEIVER

Improved AC-DC version of the famous S-40 B. One r-f, two i-f stages. Temperature compensated. Series type noise limiter. Mico-set iron core i-f coils. Seperate electrical bandspread. Improved cabinet construction. Built-in PM speaker. 7 tubes plus rectifier.

ONLY $99.95

LOW DOWN PAYMENT

HALLICRAFTERS SX-71 RECEIVER

Double Conversion sharp selectivity, plus built-in NBFM at moderate cost. 11 tubes plus voltage regulator and rectifier.

ONLY $199.50

LOW DOWN PAYMENT

Hallicrafter S-38B Receiver $49.50

WRITE FOR DETAILED SPECIFICATION EQUIPMENT SHEETS

RADIO REFERENCE MAP

CU ON 10-20 & 75 METERS

Just right for your control room walls. Approximately 28" x 36". Contains time zones, amateur zones, monitoring stations. Mail coupon today and.... 25c

FREE

Send for the 1951 complete WRL Catalog containing everything new in radio and television. Deal with the "World's Most Personalized Radio Supply House."

PHONE 7795 WRITE—WIRE

World Radio LABORATORIES INCORPORATED

COUNCIL BLUFFS IOWA

Trade for a new Hallicrafter Receiver. I'll allow you more for your present equipment. WRL buys more equipment . . . WRL sells more equipment. Our large volume of sales means faster turnover, greater savings for you! We finance our own paper—no red tape!

LOW DOWN PAYMENTS
NAME YOUR TERMS
PERSONALIZED SERVICE

WORLD RADIO LABORATORIES
744 West Broadway
Council Bluffs, Iowa R-4

Please send me:
☐ Radio Map ☐ SX-71 Info
☐ New Catalog ☐ S-77 Info
☐ List of Guaranteed Used Equipment

Name .....
Address .....
City ..... State .....

GREYLOCK TUBES

MORE THAN 400 TYPES LISTED

We're STILL DELIVERING Better Than 90%!

Complete stocks of Standard Brand Lines, including
AMPERITE—Microphones
EICO—Instrument Kits
X-CELITE—Tools
EBY—Parts
WALSCO—Chemicals & Tools
HOWARD SAMS—Photofacts
TV Antennas & Accessories.

Write TODAY for our Complete Catalog Dept. N-4

GREYLOCK ELECTRONICS SUPPLY CO.

115 Liberty Street New York 6, N. Y.

EASY TO LEARN CODE

It is easy to learn or increase speed with an Instructograph Code Teacher. Affords the quickest and most practical method yet developed. For beginners or advanced students. Available tapes from beginner's alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready—no QRM.

ENDORSED BY THOUSANDS!

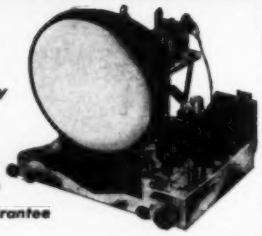
The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code without further assistance. Thousands of successful operators have "acquired the code" with the Instructograph System. Write today for convenient rental and purchase plans.

INSTRUCTOGRAPH COMPANY

4711 SHERIDAN ROAD, CHICAGO 40, ILLINOIS

VARIETY
COVERS THE WORLD
IN TELEVISION · RADIO · INDUSTRIAL · TEST EQUIPMENT & SUPPLIES

- Super Powered
- Greater Sensitivity
- Longer Range
- Superior Definition
- RMA Guarantee



The famous VIDEO PRODUCTS #630 TV CHASSIS

Licensed by Radio Corporation of America

★ THE HIGHEST STANDARDS OF TELEVISION EXCELLENCE ★

- 30-tube high quality television chassis, (incl. 3 rectifiers)
- Keyed AGC—Complete noise immunity
- Superior interlace and horizontal and vertical linearity
- Full four megacycle overall picture band-width
- Greater dynamic Video range for superior definition and better picture tone contrast
- Automatic Brightness Control
- Syncrolac—Stabilized horizontal and vertical hold
- Unequalled performance in difficult reception areas
- Available with Standard Coil long-range tuner
- Phono connection for record player
- Limiter Discriminator FM sound system for noise-free and high quality sound reception
- High Efficiency, high voltage circuit; 14 KV under load
- Full width and focus for all Cathode Ray tube sizes and types

$169.50 tax incl., plus transportation

20% Deposit with Order Required, Balance C.O.D.

Huge Electronic Grab Bag
$5 value for only.....99c

Over 100 pieces: Resistors, Condensers, Pointers—Knobs, Volume Controls, Hardware, etc.

To Be Sure, Call on Variety First for Everything You Need.

VARIETY ELECTRIC CO. INC.
468-470 BROAD STREET
NEWARK 2, NEW JERSEY

SCHEMATICS—CONVERSIONS
FOR SURPLUS GEAR

NEW LIST! MANY ADDITIONS!

Send stamped, self addressed envelope for List R. Add 25c for chart explaining AN nomenclature.

R. E. GOODHEART
BOX 1220 BEVERLY HILLS, CAL.

ANOTHER OUTSTANDING JOBBER
RADIO ELECTRIC SERVICE CO. of PENNA., Inc.
N.W. Corner 7th & Arch Sts.
Philadelphia 6, Pennsylvania

$25.95

HAS THE SENSATIONAL NEW EICO 221-X VTVM KIT IN STOCK!

Technical BOOKS

"MAKING MONEY IN TELEVISION SERVICING" by Eugene Ecklund. Published by *Howard W. Sams & Co., Inc.*, Indianapolis. 136 pages. Price $1.25.

This is a practical handbook for both the newcomer and the old timer in the television service business written by a man who has been "through the mill" himself.

Operator of a successful servicing business, the author discusses the various facets of the problem of going into business for yourself. Many of the questions cover points not ordinarily considered in books of this type but nonetheless vitally important to the success of the enterprise.

In a down-to-earth manner such matters as the over-all planning necessary when considering the establishment of a TV servicing business, the personal and economic considerations in starting such a business, initial investment, the selection of a suitable location, expansion, current finances, budget and control of finances, work control, overhead, service charges, purchasing, operating and personnel policies, business contracts, contacts, customer relations, collections, and advertising, are discussed without pulling any punches or idealizing the situation.

A valuable appendix lists essential and desirable equipment and supplies needed to operate efficiently. The listing is prepared for both one-man and 4-5 men shops along with the price range for the equipment.

Because of the gradually increasing number of business failures in the TV servicing field, we believe that shop owners should take time out to read such a book as this and decide just how their business stacks up and whether or not it is time for a careful re-evaluation of the entire problem of doing business for themselves.

* * *

"RECEIVING TUBE SUBSTITUTION GUIDE BOOK" by H. A. Middleton. Published by *John F. Rider Publisher, Inc.*, New York. 215 pages. Price $2.40.

With tube shortages again plaguing the technician and manufacturer alike, this revised edition of the publisher's "Wartime Radio Service" which originally appeared in 1944 is timely and helpful.

As pointed out by the author, this book can be used now to make the necessary tube substitutions in radio and electronic equipment and then when the tube crisis has passed may be used as a reference guide for restoring the equipment to its original state.

In addition to listing the tubes which can be substituted for units in short or critical supply, the text contains complete instructions for performing the often-necessary circuit changes.

One section has been devoted to a compilation of television receiver fila-

TUBES CRITICAL TYPES!

AVAILABLE! Immediate Delivery
'H.Q.' for NEW, STANDARD BRANDS

1B3—4,000	50C5—3,000
6AQ5—2,000	6J6—1,800
6W6—8,000	12BA6—2,500
1X2—10,000	50L6—4,000
6AU6—2,500	6T8—2,800
7A8—5,000	12BE6—1,000
35Z5—2,500	6AC7—2,000
6BG6G—7,500	6SN7—3,000
12AT6—5,000	12SA7—3,800
5U4—7,200	6AL5—8,600
6BQ6—3,800	6W4—8,000
12AT7—7,000	12SK7—5,000
50B5—4,500	6AK5—3,000
6CB6—6,000	12SQ7—4,000
12AU7—4,000	

ALSO: 'T.V.' & other Radio Types

AND WE'RE ALWAYS BUYING: Tubes of all types & Resistors (foreign & domestic) SPOT CASH! ANY QUANTITY!

STATE LABS., 202 E. 44th St. NYC 17 (Phone: MU 7-0566)

$149.50 PLUS F.E.T. FOB, N.Y.
630 CHASSIS
Manufacturer Lic. Under R.C.A. Patents

Chassis Features:—
Molded Condensers
Voltage Tripler
Keyed AGC, etc.
Send 25% with order
Prices subject to change without notice

"ELECTRONIC" APPLIANCES, INC.
9220 Church Ave., Brooklyn 12, N. Y.

TELEVISION
PREPARE FOR A GOOD JOB!
BROADCAST ENGINEER
COMMERCIAL OPERATOR (CODE)
RADIO SERVICEMAN
Television Servicing
(Approved for Veterans)
SEND FOR FREE LITERATURE
BALTIMORE TECHNICAL INSTITUTE
1425 EUTAW PLACE, BALT. 17, MD.

5U4G's
WHILE THEY LAST
$1.35 Post Paid
BELLE MEAD ELECTRONICS
Belle Mead, N. J. Phone: Belle Mead 8J2

TV CONVERSIONS
COLOR & BLACK and WHITE
Latest and authoritative 35 page booklet giving complete information, schematics and detailed drawings on how to convert your present TV set to COLOR or to a BIG 16" or larger screen. Send $1.00 and receive your booklet postpaid. Write for FREE parts list.
COLOR TELEVISION LABS.
1638 Westchester Ave Dept. RN-1 Bx 60, N. Y.

NEW TV-RADIO TUBES 100 TO 1000 LOTS
6T8-12AU7-12AT7-12SA7 ETC.
PARAMOUNT ELECTRONICS
734 N. LA SALLE ST., MOhawk 4-4085, CHICAGO 10, ILL.

ment circuit arrangements, another to servicing suggestions, while the fifth and final section provides such data as RTMA receiving tube ratings; tube base information; receiving tube characteristics; CR tube bases; CR tube characteristics; a cross-index of Army VT and commercial numbers; ballast tube and resistor codes, etc.

Service technicians and others concerned with the repair and maintenance of electronic equipment will find this book particularly helpful at the present time.

* * *

"RADIOFILE—1950 ANNUAL", compiled by Richard H. Dorf. Published by *Richard H. Dorf*, 255 West 84th Street, New York 24. 24 pages. Price 50 cents.

The new "annual" contains an index and cross index of articles covering the audio, radio, and television fields as published by 15 trade journals during the year 1950.

Designed for all persons interested in the various phases of radio and television, the booklet provides ready reference in easy-to-use form. Technicians, students, engineers, hams, and hobbyists will find that reference to the "annual" is an easy way to locate articles on any specific topic.

* * *

"HAM'S INTERPRETER" by Pentti Aarnio, OH2SQ. Distributed in the U. S. by *Ben E. Wilbur*, 32 Whittlesey Ave., East Orange, N. J. 36 pages. Price $1.00.

This slim little volume packs a lot of information into a relatively few pages.

Designed for the ham whose contacts include "far away places," this book lists in seven languages such data as the alphabet, numbers, all types of phrases needed in ham operation, and a listing of unusual words which might be needed during a contact.

The languages covered include English, French, Spanish, Italian, German, Swedish, and Finnish. With this book at hand, unilingual hams should be able to increase the scope of their contacts with non-English speaking amateurs throughout the world.

* * *

"RAPID TV TROUBLE SHOOTING METHOD" by H. G. Cisin. Published by *H. G. Cisin*, 200 Clinton St., Brooklyn 2, N. Y. 24 pages. Price $1.00.

This booklet outlines and explains in some detail the author's method for troubleshooting television faults.

The new method is based on three basic steps which consist of (1) recognition of the trouble by means of tabulated trouble symptoms, (2) the application of one or more of the thirteen special checks to be applied to the section of the receiver proven faulty, and (3) detailed instructions for locating the fault rapidly and efficiently.

Step-by-step procedures for locating over 114 different types of television troubles are also included along with 69 "rapid checks" which cover alignment procedures, etc. Over 25 waveform oscillograms are included in the "rapid check" section. —30—

CHECK THESE MONEY-SAVING SURPLUS "BUYS"!

HUNDREDS OF ITEMS NOT LISTED—SEE OUR JAN., FEB., MARCH ADS FOR FULL DETAILS!

BEAM MOTORS With Complete Operating Instructions for Use on 110 V. 60 Cycles. $3.95 Postpaid in U.S.A. Powerful highly geared motors for TV aerials and Ham Stations. Compare this price anywhere!

R-9A/APN-14 160 Meter Loran Receiver plus high flux scope; and low voltage pwr. supply. 3 Channels tunable 1.6-3.3 mc, 1 channel tunable 7.58-11.75 mc. With schematic, less tubes. Excint. cond. used $3.88

CONTROL BOX BC-606. Contains 2 phone jacks, switch, 50K pot and knob, bag of hardware, terminal strip, lots of parts for your collection ..... Postpaid $ 1.49

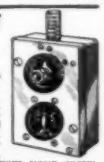
BC-733 RECEIVER with tubes 12.95

TU UNITS (BC-375); shp. wt. 25 lbs. 2.49

420 MCS. EQUIPMENT:
BC-688A Receiver, less tubes 5.95
BC-689A Transmitter, less tubes 7.95

FIL. TRANSFORMER 5-V. 115 amps for welding and pipe thawing. 2 of these paralleled are great for spot welding. Each 12.95
2 for 19.95

GRID DIP METER KIT $7.95 Postpaid in U.S.A.



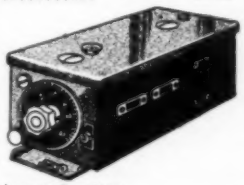
Tells where your equipt. is in radio spectrum. 955 OSC. Range appr. 3 to 170 megs. For Phone or CW monitor, harmonic indicator, absorption wavemeter, measured tuned circuits, antennas, etc. FB for TVI checking. Power requirements 6.3 filament, 150 V DC, easily obtained from your recvr. With instructions on calibrating coils, etc.

LOW PRICES ON SCARCE TUBES!
Many May Be Available For Last Time
Check These Low Prices!

RK-65	$19.50	5FP7	.98	3AP1	$8.95
Similar to 4-250A		5JP1	22.50	3BP1	7.95
5CP1A	3.95	5JP5	22.50	3BP5	3.50
5CP5A	3.95	5LP1	10.50	3BP11	3.50
5CP11	3.95	5LP7	10.50	4E27	9.95
24G	.98	53A Eimac	2.95	G54	.49
				G55	.49

FINAL CLEARANCE! ARR-1 RECEIVERS

With Schematic Diagrams and Complete Conversion Info., Less Tubes and Coils (You throw these away anyway when you make the conversion! ..... $3.33 Postpaid in U.S.A.



Last chance! Get the Receiver, schematic diagrams and a reprint of "A 220 MC CONVERTER FROM THE SURPLUS R-1/ARR-1" by Leroy W. May Jr. (W5AJG), an article from RADIO & TV NEWS, Jan., 1949 issue. Ideal for 50, 144, 220 MC Converters or Preselectors. Also TV boosters. FB for hopping up the SCR-522 Receiver on 2 meters.

OSCILLOSCOPE KIT 3-Inch with the BC-929 as the foundation. Comes with 3BP-1, 2X2, 60 cy. hi-voltage and filament transformer, and complete conversion and schematic. F.B. service bench, transmitter checking, school instruction. Now own an oscilloscope at a ridiculously low price $17.95

EQUIPMENT WANTED!
Need all types aircraft, radio, radar, test equipment. TOP PRICES FOR ARC-1's, R5A/ARN7's, BC-348's, ART-13's. Try us first and be pleasantly surprised!

A Completely Staffed FOREIGN DEPT.
Prompt and efficient service to all Export Inquiries and Orders. Correspondence in all languages. Write "Attn. Foreign Dept. ALVARADIO."

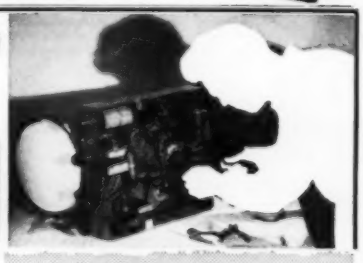
ORDER DIRECT FROM THIS AD!
Prompt, speedy shipment. Cash with order. Minimum order $3.00. 25% deposit on C.O.D. orders. Shipments by truck, or RR express collect, or Calif. buyers please. Add state sales tax. All prices subject to change. All merchandise subject to prior sale.

ALVARADIO SUPPLY CO.

DEPT. A-12, 341 S. VERMONT, LOS ANGELES 5, CALIF., DUnkirk 8-2211

Let MILTON S. KIVER Help You Prepare For COLOR TV And...

TELEVISION SERVICING



Easy to TRAIN AT HOME This Practical Way!

Men with the right training in Television Servicing are in big demand . . . pull down big pay. T.C.I. TRAINS YOU RIGHT with easy-to-follow technical training designed *by* servicemen, *for* servicemen! You learn practical, professional type Television Servicing without leaving your present job. Included are money-making extras such as set conversion, master antenna installation, COLOR TV and field servicing short cuts. You can start earning Television money after the first few lessons. You learn to test, trouble shoot and repair all types of TV sets. You learn **COLOR CONVERSION** too!

HERE'S HOW YOU GET EXPERIENCE!

You train on your own large screen modern television receiver, furnished as part of your course. This set is yours to keep! As an optional feature you can get two weeks of actual field experience out on service jobs and on the repair bench for Chicago's largest independent servicing organization. You learn Television Servicing by *actually doing* Television Servicing . . . you get the *practical* know-how you need to qualify for BIG MONEY in this fast-growing field. **Age is no barrier. Many TCI students are over 40!**

ACT NOW! Fill out and mail coupon for FREE Catalog and SAMPLE LESSON. Write TODAY!

YOU GET and keep modern large screen Television receiver.
YOU DO actual testing, servicing, trouble shooting and repairing

FOR THE BEGINNER
TCI offers a low-cost Pre-Television Course in Radio, especially designed to prepare you for television in just 5 to 7 weeks. Everything you need from basic radio . . . through servicing . . . to Television.

MAIL NOW FOR FREE BOOKLET

TELEVISION COMMUNICATIONS INSTITUTE
205 W. Wacker Dr., Dept. 1-H, Chicago 6, Ill.

MILTON S. KIVER, President
TELEVISION COMMUNICATIONS INSTITUTE
205 W. Wacker Dr., Dept. 1-H, Chicago 6, Ill.

O. K. Mr. Kiver! Rush FREE Catalog on your practical home study course in Television Servicing, including COLOR TV. Include FREE Sample Lesson. I am not obligated. Salesman will not call.

Name ..... Age .....
Address .....
City ..... Zone ..... State .....
( ) BEGINNERS check here for information on Pre-Tel Radio Course.

YOU'RE RIGHT! IT'S RED ARROW AGAIN
FOR *BIGGER and BETTER BARGAINS*

SPECIAL! 300 OHM TWIN LEAD TV LINE. $3.89 per hundred ft. ($35.00 per thousand ft.)

FILTER UNIT
This unit is an excellent buy for the parts alone. Some parts are worth more than we're asking for the whole unit.
1—40 MFD @ 450V
1—1600 MFD @ 12V
1— .5 MFD @ 400V
2— .5 MFD @ 50V
1— .01 MFD @ 400V
2—20 Watt Resistors
2—Filter Chokes
3—RF Chokes
1DPST Toggle Switch
Miscellaneous hardware, wire, etc.
BRAND NEW, ORIGINAL PACKING, 89c ea. (10 for $7.50)

FP TYPE CONDENSERS
10 MFD @ 400 V, 20-20 MFD @ 50 V.....49c
1000 MFD @ 15 V. 49c 10 MFD @ 250 V. 39c

TUBES • Brand New

VT25A/10Y	39c	1626	39c
3C24/24G	59c	872A	$1.75

SLEEVING, various colors and sizes
3 ft. lengths ..... 10 for 25c (100 for $2.00)

MINIMUM ORDER—$2.00. Send 25% deposit with order, balance C.O.D. Shipped F.O.B., N.Y.C. (N.Y.C. residents add 2% sales tax.)

TRANSMITTING MICAS—TYPE F2L
.0001 @ 5000 V.....49c each
.00025 @ 5000 V.....49c each

CORDS CD478—5 ft. long with Alligator Clips, can be used as test leads.....19c pair
CD307A with PL55 and JK26.....69c each

TERRIFIC KIT SALE
Kit of 50 Assorted KNOBS.....$1.19
Kit of 100 Assorted PAPER TUBULAR CONDENSERS, 200 to 800 V.....5.75
Kit of 10 Assorted VOLUME CONTROLS.....2.79
Kit of 100 MICA CONDENSERS.....4.95
Kit of 50 TRIMMERS.....1.98
Kit of 100 CERAMICON CONDENSERS.....4.95

BC 783-B AMPLIFIER
Brand New—Original Packing—Made by G.E. Contains the following parts, mounted on a chassis 2" high, 2½" wide, 8" long.
1—Metal R.C.A. 6L6 Tube.
1—4 MFD—600 VDC Pyranol.
1—.1—600 VDC Bathtub.
1—.3—600 VDC Bathtub.
1—8,000 ohm 20 watt w.w. resistor.
1—10,000 ohm 20 watt w.w. resistor.
5—Resistors—1 and 2 watts.
4—Mica Condensers.
1—Phone Jack.
1—Ceramicon Socket.
2—Terminal Strips.
$6.95 each

DYNAMOTORS
BD 77—Brand New.....$8.95
PE 73—Used, Excellent.....4.95
PE 94—Used, Excellent.....4.95

RED ARROW SALES Dept. A 63 East Broadway, N.Y. Phone COrtlandt 7-5425

antenna manual

The most practical, comprehensive book on antennas. 300 pages of down-to-earth help on antenna, feed line, radiation and propagation for all frequencies up to 1000 Mc. Including FM and TV. Plain language; no need to brush up on math. A necessity for everyone interested in transmission or reception.

$3.50 PER COPY —
By mail, $3.65 postpaid. Foreign, $3.75

AT YOUR FAVORITE DEALER OR DIRECT BY MAIL FROM
Editors and Engineers
1312 KENWOOD ROAD, SANTA BARBARA, CALIFORNIA

TWIN-TRAX* TAPE RECORDERS
designed... with the ENGINEER in mind
A COMPLETE SERIES

. . . of high fidelity, dependable tape recorder—from transport mechanisms to highly specialized instruments, including the one YOU want. Write today for catalog 5101. Includes ALL technical specifications and direct factory prices.

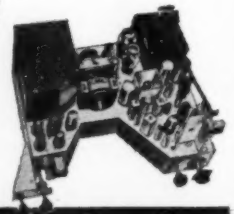
AMPLIFIER CORP of AMERICA
398-10 Broadway, New York 13, N. Y.
*Trademark Reg.

NOW! AT Hy-Grade! the SKY-HIGHEST VALUE in Television Today!

World Famous Quality
630
TV CHASSIS only
$159.95 less CRT All Taxes Included

Hard-to-Get! Virgin Polyethylene
300-ohm TV WIRE!
IMMEDIATE DELIVERY!
Write for price and quantity quotations—NOW!

For SKY-HY VALUES at rock-bottom costs —It's HY-GRADE!



Yes, you can believe your eyes! Here's the exact duplicate of the incomparable RCA 630TS Circuit—television's unmatched standard for super-sensitivity and stability—**now with all the newest features** of trigger-fast Keyed AGC, Voltage Doubler, Standard Tuner, molded condensers, **plus** the finest quality components, Yoke, Focus Coil, Mounting Brackets, **plus** 30 tubes. Supplies 13 to 14KV under load for **full** brilliance and width for **all** rectangular and round 12¾, 14, 16, 17, 19 and 20" tubes.

At only $159.95 this is **the TV super-value you can't afford to miss!** Order several **NOW!** Immediate Delivery! 25% deposit with order, balance C.O.D., f.o.b., Brooklyn, N. Y.

National Distributors of Electronic Parts and Equipment

Hy-Grade Electronics, inc.
1509 EAST NEW YORK AVE., BROOKLYN 12, N. Y.

Classified

Rate 50c per word. Minimum 10 words

RADIO ENGINEERING

RADIO Engineering Broadcasting, Aviation and Police Radio, Servicing, Marine Operating and Electronics taught thoroughly. Expenses low. Write for catalog. Valparaiso Technical Institute, Dept. N, Valparaiso, Ind.

PANELS for electronic, nucleonic construction projects. Complete service for designers, custom builders. Circular upon request. Gilpin Instrument Works, P. O. Box No. 8, Mt. Clemens, Mich.

SALE

RADIO and Television Tubes. We have all numbers. They're all new at good discounts. Write us for your needs. Immediate response. Beacon Stores, Inc., Anderson Ave., Grantwood, N. J.

HOTTEST surplus list in the country. Electronics-Hydraulics, Aircraft-Gadgets. Dick Rose, Everett, Wash.

COLOSSAL bargain in radio parts, over 150 assorted radio parts including resistors, condensers, controls, coils, etc. All new, $75.00 value, guaranteed satisfaction or money refunded, postpaid in U. S. A., $2.50. Write for catalog. Buyers Syndicate, 30 N. Taylor St., Springfield 3, Mass

RECORD changer parts for leading makes. We ship everywhere. Friend's Wholesale Distributors, 106 N. 6th St., Philadelphia 6, Pa.

TWO #102 Jefferson-Travis 10-watt Radio Telephones in original crates. Operates on 6 or 12 volts DC. Best cash offer. F.O.B. Knoxville, Tennessee. Athumor Manufacturing Co., Inc., P. O. Box 3037, Knoxville 17, Tenn.

TUBES. Hard to get? Send want list for quotations. Standard brands only. Quantity discounts available. Telradco, Box 108, Elizabeth, N. J.

DIAGRAMS Radio, Record Changers, Recorders, 75c; Television with Service Data, $1.25 up. State manufacturer and model number. Kramer's Radio Service, Dept. N8, 36 Columbus Ave., New York 23, N. Y.

HARD-to-Get-Tubes. Good discounts off list. Free list, no dealers. 25W/200 ohm Clarostat rheostat, ½" long shaft, original box, 49c. Tubes bought. Highest prices paid. Send list. Immediate action. Betz, 73 Caroline Ave., Yonkers 5, N. Y.

53 OHM Coax; 300 ohm twin; reasonable. Inquire: Harry Van Dick, Little Falls, N. J.

WANTED

CASH for your test equipment. State condition, best price. Carwen, 9 S. Hawthorne St., Manchester, Conn.

GRAIN of Wheat Lamps, 323, 322, 328, etc. Radar Magnets, any shape, size, condition. Blan, 64 Dey St., New York.

NEED ART-13, DC-348, DY-17, PS-12, PS-13, I-100, ARC-1, ARC-3, etc. Also Signal Generators, Microvolters and any other type test and laboratory equipment, tech. manuals. Also have equipment to trade. Advise what your needs. Write: Bob Sanett (W6REX), 4668 Dockweiler, Los Angeles, Calif.

AN/APR-4, other "APR-," "ARR-," "TS-," "IE-," ARC-1, ARC-3, ART-13, everything surplus; Tubes, Manuals, Laboratory equipment. Describe, price in first letter. Littell, Farhills Box 26, Dayton 9, Ohio.

PATENT ATTORNEYS

LANCASTER Allwine & Rommel Registered Patent Attorneys. Patent practice before U.S. Patent office. Validity and Infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Suite 414, 815 15th St., N.W. Washington 5, D.C.

HERMAN Lewis Gordon. Registered Patent Attorney. Patent Investigations and Opinions. Warner Building, Washington, D. C.

HELP WANTED

RADIO Operator. Foreign assignment available to single man with first or second class radio telegraph commercial license. Should be good operator, typist and able to maintain equipment. Attractive two-year contract. In first letter cover age and experience and salary expected. Box 512, % Radio & Television News, 185 N. Wabash Ave., Chicago 1, Ill.

CORRESPONDENCE COURSE

USED Correspondence Courses and Books sold and rented. Money back guarantee. Catalog free. (Courses bought.) Lee Mountain, Pisgah, Ala.

AMATEUR Radio Licenses. Home study theory course. Preparation for FCC examinations. Low cost. Personal coaching. Federal Electronics Institute, 45 E. Putnam, Dept. D, Greenwich, Conn.

MISCELLANEOUS

SPEAKERS repaired at wholesale prices, guaranteed work. Amprite Speaker Service, 70 Vesey St., New York 7, N. Y.

INVENTORS: Cash for ideas. Amazing tested selling plan sent for free examination. Gives 138 firms (addresses, men to contact) that buy patented or unpatented inventions. Lists inventions wanted, copyrighted disclosure form, price to ask, etc. Fact-filled Inventor's Sales Book sent on 10-day Free Examination. If you decide to keep, mail $2.25 total cost. Otherwise return book, no obligation. Cash orders, $2.00 postpaid. Science and Mechanics Magazine, 954 Dunham Bldg., Chicago 11, Ill.

BUILD your own Soldering Gun cheaply from old Transformer. Plans, 50c. Box 851, Fairborn, Ohio.

RHOMBIC TV Antennas. Build your own. Power gains up to 100 for extreme fringe area reception. Drawings, complete instructions for 24 sizes, $1.50. Richard J. Buchan, WOTJF, Bricelyn, Minn.

15 TESTED One-tube circuits 25c, including "Radiobuilder," catalog. Laboratories, 411-H Capitol Hill, Reno, Nev.

PHONOGRAPH Records cheap. Catalogue free. Paramount, CG-313 E. Market, Wilkes-Barre, Pa.

PHOTO CREDITS

Page	Credit
31, 32 (top left), 33 (bottom), 34	U. S. Navy
32 (top right & bottom)	U. S. Coast Guard
33 (top)	Joint Army Navy Task Force
35	Capitol Records, Inc.
43 (right)	United Technical Labs.
46, 47	Cincinnati Research Co.
50, 51, 52	John R. Meagher
53, 55	Republic Productions, Inc.
58, 136	The Hallicrafters Co.
62, 104	Station TGNA
106	General Electric Company
110	MARS

ERRATA

An error appeared in the circuit diagram (Fig. 2, page 46 of the February 1951 issue) for the v-o-m and grid-dip oscillator. Please see page 119 of this issue for the correct diagram.

* * *

In the article "A Deluxe Signal Tracer," appearing in the January 1951 issue, an error appears in the diagram on page 66. The lower end of the 6V6 cathode resistor shown in Fig. 6 should be grounded.

* * *

The schematic diagram of the converter ("Ham Converter for 2-6-10-15 Meters") appearing on page 49 of the February 1951 issue is incorrect in that the heater of the 9002 oscillator should be connected to the cathode of the tube at the socket instead of being grounded.

* * *

The voltage designations on the switch shown in Fig. 2, page 57 ("An Electronic A.C. Voltmeter") of the February issue should be transposed.

* * *

The cathodes of the 6L6 tubes in Fig. 7 in the article "A Flexible Record-Reproduce System" (February 1951, page 64) should not be tied together.

* * *

In Fig. 1 of the article "A Self-Equalizing Preamp," appearing on page 49 in the November 1950 issue, a 470,000 ohm resistor should be inserted between C_7 and the top end of R_{11}.

* * *

It has been called to our attention that the suggestion for using an electric razor cord (page 149 of the February 1951 issue) is misleading. Many razor cords now on the market are made of #27 tinsel wire which is rated at 50 watts. Obviously cords of this type will overheat in time. Should you intend to use an electric razor cord, be sure it is of sufficient size to carry the load.

HIGH FIDELITY
WIDE ANGLE DISPERSION
and HANDSOME APPEARANCE

University LOUDSPEAKERS

MODEL 6200 WIDE RANGE SPEAKER

Indisputably today's best buy in a top quality, high fidelity 12" reproducer

Specially shaped one-piece moulded cone provides wide angle dispersion. Cone edge treated for long life, also reduces distorting standing waves. Three inch dural dome at cone apex reinforces "highs", minimizes cone "breakup". Exclusive 1½ lbs. "W" shape Alnico magnet, shockproof assembly result in unusual conversion efficiency—requires less amplifier power, assures low distortion output. 4" overall depth perfect for P.A. or home wall and ceiling mounting. Response 45 to over 10,000 cps, 8 ohms, 30 watts power capacity.

Whether for the home or for use in a sound re-inforcement installation, specify UNIVERSITY—high fidelity reproducers with a tradition for quality and performance. UNIVERSITY "progressive engineering" assures you exclusive pace-setting design features, reliable factory ratings, and the advantage of specialized manufacturing know-how that brings you top quality products at sensible cost. Investigate, and be convinced that installing UNIVERSITY means installing the best.

Available Now! The TECHNILOG

New and informative, a technical catalog with valuable hints on sound-casting techniques and installation suggestions. Write today to Desk 29.

UNIVERSITY LOUDSPEAKERS • INC

80 SO. KENSICO AVE., WHITE PLAINS, NEW YORK

TUBES? We have 'em in stock now!

FULLY GUARANTEED

7JP4	$18.50	6SK7GT	$ 1.35
10BP4	24.00	6SN7GT	1.85
12LP4A	25.00	6SN7WGT	2.75
14BP4A	26.25	6SQ7GT	1.35
16HP4A	33.00	6T8	2.50
16RP4A	33.00	6V6GT	1.60
17BP4A	34.00	6W4GT	1.45
20CP4A	57.50	6W8GT	1.85
0Z4 OZ4G	.90	6X4	1.00
1A7GT	1.00	6Y6G	1.10
1B3GT	1.75	7C5	1.10
1R5	1.40	7C6	1.10
1U4	1.00	7C7	1.10
1X2 1X2A	1.70	12AT7	2.40
2B7	1.30	12AU7	2.00
3Q4	1.10	12BA6	1.10
5T4	1.95	12BE6	1.10
5U4G	1.30	12BH7	2.00
5V4G	1.90	12SK7	.99
6AC7	1.80	12SN7GT	1.70
6AG5	1.80	19T8	2.70
6AG7	1.95	25L6GT	.95
6AH6	2.65	35C5	1.10
6AK5	2.95	35L6GT	1.10
6AL5	1.30	35Z5GT	.90
6AQ5	1.50	50A5	1.55
6BE6	1.35	50C5	1.10
6BF5	1.75	50L6GT	1.10
6BQ6GT	2.50	2E24	3.95
6BY5G	2.15	2J36	89.95
6CB6	1.65	2J48	13.50
6CD6G	4.00	2K45	150.00
6J5GT	.70	3DP1A	3.50
6J6	2.65	5JP1	22.50
6K6	1.10	6D4	5.00
6S4	1.50	6F4	5.95
6SA7GT	1.35	6J4	5.00
6SH7	.70	813	8.95
		832A(RCA)	10.95
		872A	2.95
		100TH	11.00
		450TH	29.95
		RK65	24.95

Many Other Types in Stock Now

Maguire Deluxe Mobile 75 Meter Xmtr., New, Complete $25.00

BC-375 Xmtr W/Tubes and Tuning Unit Good Condition 22.00

Terms: 25% with order. Balance C. O. D. Send remittance in full and save C. O. D. charges.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

BarryElectronicsCorp.

136 Liberty St., Dept. E-318, New York 6, N. Y.

a message to music lovers and record playing enthusiasts!

Your records, (LP's or Standard) need not produce fuzzy, noisy, distorted music. Inherent in their sound grooves is fine musical realism of concert hall quality that can be recreated by record players equipped with fine audio components: pickup, arm, compensator, preamplifier, etc. Such components by Pickering are the finest available: the choice of engineers, leading retord critics, music lovers and specialists in the production of custom record playing systems.

Pickering High Fidelity Components are available through leading jobbers and distributors everywhere; detailed literature will be sent upon request.

Pickering & Co., Inc.
Oceanside, N. Y.

Address Department C

For the utmost in quality specify Pickering Audio Components!

RADAR, COMMUNICATIONS AND SONAR TECHNICIANS

W-A-N-T-E-D

For Overseas Assignments

Technical Qualifications:

1. At least 3 years practical experience in installation and maintenance.
2. Navy veterans ETM 1/c or higher.
3. Army veterans TECH/SGT or higher.

Personal Qualifications:

1. Age, over 22—must pass physical examination.
2. Ability to assume responsibility.
3. Must stand thorough character investigation.
4. Willing to go overseas for 1 year.

Base pay, Bonus, Living Allowance, Vacation add-up to $7,000.00 per year. Permanent connection with company possible.

Apply by Writing to

D-4, P.O. Box 3575,
Philadelphia 22, Pa.

Men qualified in RADAR, COMMUNICATIONS or SONAR give complete history. Interview will be arranged for successful applicants.

EASY TO LEARN IN YOUR HOME...
ELECTRONICS RADIO and TELEVISION

GET YOUR F.C.C. LICENSE

Step ahead with Central training! ● ● ●

- ***Broadcast Engineers (AM-FM-TV)***
- ***Manufacturing Technicians***
- ***Radio-Television Serviceman***
- ***Emergency Radio Operators***
- ***Airlines Radio Operators***
- ***Public Address Servicemen***

ALL essential jobs in a NEW, RICH field of OPPORTUNITY. Free placement service has put our graduates in top positions from coast to coast. Plan your professional career now, by sending for FREE LITERATURE.

CENTRAL RADIO and TELEVISION SCHOOLS, Inc.
Dept. E-3, 1644 Wyandotte, Kansas City, Mo.

I want complete information on how I can succeed in Radio, Television and Electronics. This does not obligate me in any way.

Name .....

Address..... Age.....

City..... Zone.... State....

INDEX OF *Advertisers*

APRIL 1951

While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.

ADVERTISER	PAGE
Acorn Electronics Corp.	108
Adson Radio & Electronics Co.	100
Aerovox Corp.	88
Allied Radio Corporation	9
Almo Radio Company	142
Altec Lansing Corp.	142
Alvaradio Supply Co.	149
American Phenolic Corporation	26
American Products Corporation	130
American Television & Radio Co.	106
Amperite Company, Inc.	108
Amplifier Corp. of America	145, 150
Arrow Sales, Incorporated	135
Ashe Radio Co., Walter	70
Astatic Corporation	103
Astron Corporation	134
Baltimore Technical Institute	148
Barry Electronics Corp.	151
Bell Telephone Laboratories	28
Belle Mead Electronics	148
Belmont Radio Corp.	15
Berlant Associates	126
Bond Equipment Company	141
Boyce-Roche Book Co.	96
Brook Electronics, Inc.	102
Brush Development Company	6
Buffalo Radio Supply	107
Candler System	78
Capitol Radio Engineering Inst.	23, 88
Central Radio & Television School, Inc.	152
Chelsea Television Center	145
Chicago Industrial Instrument Co.	76
Chicago Transformer Company	16
Clarion Metal Products Mfg. Corp.	138
Clarostat	126
Clear Beam Television Antennas	146
Cleveland Institute of Radio Electronics	73
Color Television Laboratories	148
Columbia Electronic Sales	132
Comet Electronic Sales Co.	121
Commercial Surplus Sales Company	134
Communications Equipment Company	101
Concord Radio Corp.	83
Coyne Electrical & Television-Radio School	70, 86
Credda, Inc.	137
D & H Distributing	142
Dakoline Chemical Co., Inc., The	94
De Forest-Sanabria Corp.	7
DeForest's Training, Inc.	5
East Coast Electronics	94
Editors & Engineers, Ltd.	138, 146, 150
Edlie Electronics, Inc.	116
Electro Devices	114
Electro Voice, Inc.	95
Electronic Appliances, Inc.	112, 148
Electronic Instrument Co., Inc.	Third Cover, 134, 138, 142, 148
Electronics Institute, Inc.	142
Electro-Technical Industries	146
Emmons Radio Supply	112
Espey Mfg. Company, Inc.	117
FM & TV Magazine	113
Fair Radio Sales	119
Feller Engineering Co.	130
Fisher Radio	120
Franklin Technical Institute	130
G. L. Electronics	136
General Electric Company	13, 17
General Electronic Distributing	80, 81
General Test Equipment	143
Gensler, B. N.	151
Goodheart, R. E.	148
Greenlee Tool Co.	76
Greylock Electronic Supply Co.	147
Hallicrafter Company, The	10
Harrison Radio	134, 141, 146
Harvard Laboratory	78
Harvey Radio Company, Inc.	146
Heath Company	64, 65, 66, 67
Henry Radio Stores	86
Hunter Company, H. D.	117
Hy-Grade Electronics, Inc.	150
Hytron Radio & Electronics Corp.	29
Indiana Technical College	145
Industrial Television, Inc.	74
Instructograph Co.	147
Insuline Corp. of America	78
International Resistance Company	20, 21
J.F.D. Mfg. Co., Inc.	88, 120
La-Pointe Plascomold Corporation	76, 98
Leotone Radio Company	70
McConnell's	143
McGee Radio Company	84, 85
McGraw-Hill Book Co., Inc.	141
MacMillen Company	99
Mallory & Co., P. R.	Fourth Cover
Mass. Radio School	78
Merit Coil & Transformer Corp.	128
Metropolitan Overseas Supply	135
Midwest Radio & Television Corp.	114
Miles Reproducer Co., Inc.	146
Milwaukee School of Engineering	124
National Radio Institute	3
National Schools	11
National Union Radio Corp.	18
Newark Surplus Materials	130
Newell Co., The	139
Niagara Radio Supply Corp.	97
Offenbach & Reimus Co.	125
Ohmite Mfg. Company	27
Olson Radio Warehouse	74, 75
Opad-Green Company	139
Paramount Electronics	148
Peak Electronics Company	72
Penn Boiler & Burner Mfg. Corp.	115
Pfanstiehl Chemical Co.	112
Phoenix Electronics, Inc.	120
Photocon Sales	86
Pickering & Company, Inc.	151
Platt Electronics Corp.	90, 91
Poly-Tech	110
Premier Radio Tube Co.	89
Progressive Electronics Company	122
Pyramid Electric Company	24, 30
RCA Institutes, Inc.	146
Radio City Products Co.	140
Radio Corporation of America	Second Cover, 69, 111
Radio Craftsmen, Inc., The	92
Radio Ham Shack, Inc.	105
Radio Parts Company	77
Radio Specialty Mfg. Co.	129
Raytheon Mfg. Co.	25
Red Arrow Sales	150
Reeves Soundcraft Corp.	94
Rek-O-Kut Co., Inc.	100
Reliance Merchandising Co.	138
Rider Publisher, Inc., John F.	109
Rinehart Books, Inc.	134
Sams & Company, Howard W.	82, 138
Schott Co., Walter L.	117
Science Kits, Ltd.	138
Solo Electronics Sales Corp.	134
Spartan School of Radio and Electronics	108
Spencer-Kennedy Laboratories, Inc.	100
Sprague Products Co.	14
Standard Transformer Corp.	137
Star Electronics Distr., Inc.	126
State Laboratories	148
Steve-El Electronics	127
Sun Radio of Washington, D. C.	68
Supreme Publications	63
Sylvania Electric Products, Inc.	22
TAB	153, 154
Technical Radio Parts Co.	142
Telepix Company	146
T. V. Wire Products	144
Television Communications Inst.	149
Television Materials Corporation	131
Television Supply Company	87
Thomas Electronics, Inc.	133
Trad Television Corp.	72
Transcriber Company	102
Transvision, Inc.	104
Triplett Electrical Instrument	19
Tri-State College	139
Turner Company	131
United States Steel Company	12
United Technical Labs	133
Universal Microphone Corp.	70
University Loudspeakers, Inc.	151
Upstate Distributors	102
Valparaiso Technical Institute	143
Variety Electric Co.	148
V & H Radio & Electronics Supply	129
Ward Products Corp.	143
Weller Electric Corp.	8
Wells Sales, Inc.	93
West Region Electronics	130
Wholesale Radio Parts Co., Inc.	118
World Radio Laboratories, Inc.	147
YMCA Trade & Tech. School	141

866A KIT and XFORMER

2 Tubes, Sckts, xfmr 115v 60cyc Inpt, outpt 2.5vct/10a/10Kvins $6.98

DIODE PROBE TUBE!
Unexcelled for NO-LOSS UHF Testing. Ultra-Sensitive Sub-Miniature—Envelope App. 1¼"x8⅜". Element & Probe at Tip. Low Pwr. Htr. BRAND NEW w/Data, VR92. .25c; 5 for $1

O.K. TUBE SPECIALS

Tested Perfect—Standard Brands

Keys	Broken—Guaranteed		
1B3GT $1.33	6H6 $1.75	5W4GT	
5U4G .98	6L6G 1.29		$ .90
5Y3GT .65	6SC7 .98	12A8	.89
6A8T .96	6SF5 .49	12SA7	.99
6AC7 1.45	6SF7 .49	12SN7GT	
6AG7 1.45	6SH7 .66		1.10
6BG6G 1.24	6SK7 .90	19BG6G	
6H6 .49	6SN7GT		1.79
6J5 .75		25L6GT	.54
6J7 .60	6SQ7 .75	25W4GT	
6K6GT .75	6V6 1.59		1.00
6N7 .98	6V6GT 1.00	35Z5GT	.75

"WILLIAMSON" 10W HI-FI KIT

10cyc to 20Kc with Ease! Internationally Famous. To I Mc. for Experimenters. Incl Pwr Supply, RCA Chassis, Less Pre-Amp & Output Xfmr $29.95
Wmson Pre-Amp Kit & Tone Boost Amplifier 34.95
"Wmson" 32-page Booklet 69c
Super-Wide-Range Hi-Fi Kit: 20 cyc to 20Kc, 10W. Max Harmonic Distortion 1¾% @ Full Output; 0.5% /5W output. PreAmp, Tone Control, RCA chassis, Less Output Xfmr Triodes thruout $34.95
G-E Var Reluc Cartridge RPX 050 ..... 8.69
G-E Var Reluc Cart. RPX040 or 041 ..... 6.29
G-E Spkr 12D1B 19.49
UTC Hi-FiOutptXfmr 30WPP6L6/2A3/6A5G Pri 4000 ohms CT: Sec 5 taps 2½ to 25 Ohms 5.98
SENSATIONAL 10" Hi-Fi Spkr Ideal 10Watt HomeSize, Concentric, Internationally the Best! Separate Driver-Woofer & Horn Driver Tweeter-50 to 16000 cps Range! 18.98

DYNAMIC SPEAKER BUY!
5" Dynaspkr 3000 ohm field HvyDuty w/ OutptXmfr forPentode From Equip. Like New, Tested, Gtd. $1.39; 4 for $5
"G-I" Gov. Contrld PhonoMotor 33 rpmw/ Speed AdjLever,HvyDty 110VACoper, A 814 Buy. SPECIAL $4.69
Gov. Wts. for "G-I" Motors.2 for 39c; 6 $1

HEADSETS

24000 ohms—P16, 2 Rcvrs w/Band, Strap, 7 ft. cond. Plug. Brand New $4.49
6000 ohms—H51B, 2 Rcvrs w/PL54&CO73A. Less Band 98c
600 ohms—H33B 2 Rcvrs w/Band, Cushion, Plug. Used Exc. $1.98

BUILD A BANTAM 1-WATT XMITTER

With This Bargain Foundation Unit
Free Instructions. Takes 2 plug-in FT-243 Xtals & Coil. W/1.140mmf Cndsr & Xtal Socket ..... 2 for 49c
Complete with Xtals & Coil ..... 2 for $1.69

Hi Gain Dynamic Mike & Xfmr. Buy

Comb. hi-gain Dyn Mike Xfmr UTC/ Super Elec 3 wdg, 600 ohm CT & 4000 ohms Tapped 2.5cx150 ohms. Fully Shielded H'sld PLUS Exc. Fidelity Dyn Mike. Both for ONLY $1.98
Transformer only, 98c; 10 for 7.98

I-F TRANSFORMERS

456 Kc Double Slug Tuned, Shielded ..... 3 for $1; 8 for $2
10 to 14Mc FM&TV Double Slug Tuned, Shld'd ...2 for $1; 5 for $2
2.2 to 2.7Mc COLLINS/USN Slug Tuned Coil, 5 prong Mtg. 4 for $1
8.15 to 10Mc Double Slug Tuned, Shielded, Incl 2 Silv P16-25mmf Ceramic Trimmers, 6 Ceramicons & 3-AB Resistors 99c
GE-2J1G1 Selsyns, You Fix 'Em, As Is, No Returns ..... 2 for 49c
FIRE EXTINGUISHER, CarbonTet PYRENE 1 gal. 200 lb. SelfCharging w/Mtr. Like New, Shipped Dry $10.98
Hardened Elec. Wrenches 9 and 11/32, ⅜ and 15/64". Pair 25c
GLYPTAL cement, per jar 35c
RADIOACTIVE Markers 1½" OD for Car, Bike, Boat, Clip Type ..... 5 for 25c
24 Above in Metal Box w/6 partitions Slight Corrosion 98c
HOLTZER-CABOT BELL! High Efficiency Type Perm Magnet 2½" Diam, 115Volts AC/DC Only ..... 98c; 6 for $4.98

CIRCUIT BREAKERS

Heinemann Magn Bkrs, **Amps:** 0.22, 1, 2, 3, 5, 7, 8, 12, 15, 20, 25, 30, 40, 50, 70, 100, 180. Each $1.85
Sq. D & CH Toggle Sw Bkrs, **Amps:** 7½, 10, 15, 20, 25, 30. Each 98c
Klixon Thermal Push Button Bkrs, **Amps:** 5, 10, 15, 20, 30. Each 98c

PAPER CONDENSER BUYS!

WVDC	Mfd	Each	100 for	WVDC	Mfd	Each	100 for
150	.002	6c	$ 5.40	600	.0001	6c	15.40
200	.047	9c	7.20		.002	8c	17.50
	.05	12c	10.80		.004	10c	8.98
	.1	14c	12.60		.0042	10c	8.98
	.5	21c	18.90		.006	11c	9.98
400	.002	8c	7.20		.01	12c	10.80
	.004	9c	8.10		.015	12c	10.80
	.01	10c	8.98		.02	14c	12.60
	.02	11c	9.98		.03	15c	13.50
	.04	13c	11.70		.05	17c	15.30
	.05	15c	13.50		.1	23c	20.70
	.1	19c	17.10		.3	25c	22.50
	.5	24c	21.60		.5	29c	26.10
	1	29c	26.10	1200	.01	15c	13.50

Metal Cased—Oil Impregnated

WVDC	Mfd	Each	100 for	WVDC	Mfd	Each	100 for
200	.04	29c	$26.10	600	.05	39c	$35.10
300	.01	26c	23.40		.1	53c	47.70
400	.01	28c	25.20		.5	65c	58.50
	.25	46c	41.40	1000	.006	29c	26.10
	.5	54c	48.60	1500	.01	75c	67.50
600	.01	29c	26.10	1600	.01	29c	17.90
	.02	33c	29.70		.02	95c	85.50
	.04	37c	68.30		.064	99c	89.10

Molded Bakelite Encased

200	.02	11c	$ 9.90	500	.003	12c	$10.80
	.05	15c	13.50		.006	15c	13.50
300	.01	11c	9.90		.01	15c	13.50
400	.01	13c	11.70	600	.005	18c	14.60
	.05	17c	15.30		.006	18c	16.20
	.1	23c	20.70		.01	21c	18.90
500	.001	11c	9.90		.05	23c	20.70

STORAGE BATTERIES

36 Volt WILLARD Mini-BRAND, NEW! 5 cu. Designed Portable Equip Models ..... 98c; 4 for $3
2V/27AH Willard BB54 PLUS 2 Volt Vibrator $1.98
6V 6AH Willd NT6/BB214U 1.75
6V 40AH Willd ER40-6 ..... 6.98
Battery Acid. (R-Exp) 1 pt. 59c; 2 pts. $0.98
Hydrometer 1.06 to 1.24 Sp Grav 1.98
Electrolyte Meas Tube, 12" Lg ..... .25
Spec Grav Ind & Merc. Thermom ..... .98

DRY BATTERIES

Sig Corps—BRAND NEW—Tested, Shelf Dated—Guaranteed.

BA30 1.5/ 7½V	98c; 6 for $4.98
BA40 90/11½ Volts	98c; 6 for 4.98
BA43 90/45/7½ Volts	89c; 8 for 6.49
45/30Volt NEW	1949 Batty SimBURGESS XX30E, 1x2⅜x4¼ ..... 79c; 3 for 2.00

ELECTROLYTIC CNDSR SPECIALS!

50 mf/350vdc FP ..... 3 for 98c
30-15-10mf/250vdc ..... 3 for 98c
40-20mf/250-25vdc ..... 4 for 98c
30-2x20mf/450-25vdc FP 2 for 98c
10-2x20mf/450-25vdc FP 2 for 98c
4mf/450vdc Tyrex-Dyn ..... 2 for 98c
6000mf/15vac. SPECIAL $2.29

CIRCULAR SLIDE RULE

12" Equiv—21⅛" Radius PRINT STAYS ON, Laminated Plastic, Multiply, Divide, Logs, Dec Equiv, Case 98c
PARALLEL RULES, Handy Drafting Tool, 6" Lg Mfr BRUNING 39c

BANDPASS FILTER XFORMERS

SHARP CUTOFF BiQ CASED & SHIELDED 60, 90, 150 cyc ea. $2.25 ..... 3 for $5.95
UTC 854, 1024, 1250 cyc ea. $1.95 ..... 3 for $4.50

CRYSTALS

Mtd FT243 exacting S.C. Specs

3525Kc	4190Kc	5233Kc
3735Kc	4780Kc	5485Kc
3980Kc	5030Kc	ea. 98c; 3 for $2

Write for other Frequencies.
Htr Oven Xtals—HiAccy Stability 5010, 5025, 5055Kc, ea. $14.98
Rochelle Salt Xtals, 60c; 10 for $5.00

SOCKETS for CRYSTAL HOLDERS

A. 4-crystal holder ½" pins, ¾ & ½" spacing 10c; 12 /$1
B. HiFreq Dual Xtal holder FT243 10c; 12 /$1
C. HF Xtal Holders ½" spacing ½" pins 10c; 12 $1
D. Johnson Mycalex 3 pin BENDIX & WE ea. 35c

VARIABLE CONDENSERS

A. 150mmf/300VGap HF MILLEN, C & D. Special $1.39
B. BUD Dual 75mmf ea. Sect 1000V Gap, HF $1.29
C. JOHNSON 70H30-70 mmf/3000V Gap $1.29
D. Cardwell Neut 27/12 mmf 500 Volt Gap, w/Locknut 98c
E. CARDWELL TK-300-US 53 to 312 mmf, Can be made Split Stator, BRAND NEW $10.95
F. HAMMARLUND MC75S 80mmf, List $3.40, Special, each 98c
Vernier Drive 10 to 369mmf, each 69c
Midget 3 to 15 mmf, Midline, each 39c
Phasing Condenser 180 Degree Quadrants, 4 Tabs, Single Sinewave Gen $4.98
2½ Meter Butterfly Cndsr 30mmf w/RF Tank & Choke ..... 59c; 2 for 98c

FRACTIONAL HP MOTORS

1/30 HP Motor, 117/234V, 47/63 cyc. 5/.35Amps, 2600-3100 RPM, 1 hp. ¼" dia. x1¼" Shaft & Base, NEW $5.98
1/100 HP Motor, 27.5VDC, 7000RPM Cont. OSTER, NEW $2.49
24VDC Motor, 1⅛"dia.x2¼" lg.Shaft, 1g/b, NEW $1.95
Motor&Switch Assy, 28VDC/.6A/2000RPM cont., 6½x2⅜x4" overall, Cams drive 4 Silver Pl. Switches, NEW $4.98

INSULATORS

Thru-Panel Two ⅞"Hx 1¼" dia Sects & Hardware. Glazed Ceramic ..... 6 for 49c
Cylindrical, Glazed, Tapped 1¼"Hx¾" dia. 10c; 1½"Hx¾" dia. 12c

RELAYS—FAMOUS MAKE

CLARE Octal 115VAC/DPNC SPNO. $3.98
CH 2Bdpoer-Sen34 115VAC 2000ohm 2.98
S'DUNN 32AXX10 Bnestho'lood 10 ma&115VAC 4.95
ADVANCE 4001Bantenna DPDT& SPNO 15 Amp, Ceramic, HF ins 75 to 110V. $2.75; wRect115VAC 3.95
A-B0'load adj18.1/15.2/12.0/9&5.3A. 3.98
GE 1tal V'Rel C2hb 750,85,110,160V for 115vAC 9.95
GE CR2792B 117A3/28V/50A/SPNO. 1.98

KITS.....

Silver & Mica Cndsrs ..... 30 for $2.50
Controls, 50 ohm to 2 Megs. 10 for 2.98
Resistors, ½,1w, to 2 Megs. 100 for 5.98
Vitreous WW Resistors ..... 5 for .69
Sockets, Asstd, 8, 7, 5, 4P. ..... 25 for 2.49
Rotary Switches ..... 6 for 1.75
G&P Tube Caps, Asstd ..... 50 for 1.49
Coil Forms, Th'd Sm HF ..... 50 for 1.00
Iron Core Stub & Screw ..... 50 for 1.00
Elastic Stop Nuts, Asstd ..... 50 for 1.00
Knobs, Asstd, w/Insert ..... 10 for .98
Spaghetti Sleeving, Asstd ..75 ft. for 1.00
Ceramicon Cndsrs, Asstd ..... 12 for 1.00
Fuses, Asstd, LF & Buss ..... 75 for 1.95
Grommets, Rubber Asstd ..... 50 for 1.00
Resistors, 2 W Asstd ..... 20 for 3.89
Tie-Point Lugs, Asstd ..... 35 for .98

UHF ANTENNA

UHF ANTENNA 12"/300M AT5/ ARR1 Usable Citzn & Ham Band 1os Coax Term Strip Pl Cont Wpf Gask & H'ware Mobile Mtg. New. 39c; 4 for $1.00
PL259 for above ..... .65
TV CONICAL ANTENNA (Dubl-X) Sturdy Prefab Const Versatile 72, 150 or 300 ohm Match. Incl 8 elements & 100 ft. All-Copper Twinex, Cross Bar & Hd'ware, Brand New, Only $8.49
Dubl-Stacked Conical Array Similar above, but with 16 elements & all hardware plus 2 crossbars & 100 ft. All-Copper Twinex, Brand New. ..$12.98
MICROWAVE ANT AS125/APR, 1000 to 3400Mc w/UG58U Term InRuilt HiPass Fltr Flange Mtg. Incl H'ware, SPECIAL. $3.98
ANT AN1308, 33" Whip ..... .98
ANT AN131A, 11 ft. 8 sect. 2.89

Sectional Antennas

MS49-52, 12½ ft.	$1.69
MS49-53, 16 ft.	2.49
MS49-53 & extra 53, 19 ft.	3.69
MS49-56 (2-53), 26½ ft.	5.98
BASES: MP22, $2.85; MP48	2.85

RF CHOKES

A) HAMMARLUND CH500/2.5 MH8ohms 500 ma 98c
A) 20 MH/500ma/14.75 ohms DCR 8mmf dist Cap mtg ft&4¼" mtg ctrs, ceramic core 98c
B) SICKLES 85mh/250ohms/ceramic form 70c
C) NATIONAL R300/1mh/300ma/ 10ohms @ 28c ea. ..... 4 /98c
C) Two 2.5mh/125ma & .014-.002eder & Resist 45c
D) 5mh/300ma, pi wound 29c
E) MILLER 2½&5mtr/2.5mh/.27ohms/ 1A @25c 98c
F) Nat'lR152/80&160mtrs/4mh/600 ma/10ohms 98c
G) SICKLES BF 120mh/200ma75ohms.49c
H) Hash Chokes for MercuryVaporRec @ 25c ..... 5 /98c
I) SICKLES 1.5mh/200ma, ea. 25c 5 /98c

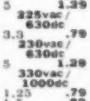
Alignment Tools

Tops Ideal NO-LOSS Alignment Screw-driver—long Insulated Shaft, Sure-Grip Knurled Knob. Only 49c
(Bottom) **RELAY Spring Adjuster** Switch-Bd Tool Slot takes up to .022". WEC No. 293 ..... 98c
Precision Feeler Gauge TL147, Ideal Teletype & Relays, Individ Gauges .012/.018/ .025/.037/.055" 98c

BAKELITE KNOBS

Polished black bakelite, ¼" dia shaft, brass bushing, with set screws, white position indicator.
Fluted, 1⅛"diax⅝"h 12c ..... 10 for 98c
Bar Knob, 1¼"lgx⅛"dia 10c; 12 for 98c

External Pwr Sup. Cord



CD277 & Plug PL114. Fits Skt SO-239 RecpBC312.14.344 ..... 344 BRAND NEW $1.49
O'Seas Pkgd ..... Five for $1

PROFESSIONAL SHARPENING STONE
INDISPENSABLE for Lab or Workshop. Finest Silicon Carbide No. 320 Carborundum Co. Unsurpassed for Precision Grinding of Crystals, Knives, Fine Tools—6"x2"x½" New. 25c
A $2.00 VALUE—ONLY

OIL CAPACITORS

Mfd	Each	Mfd	Each
1000wvdc		10000 wvdc	
.1	.72		
.45	.79	.03	3.49
1	.99	12000 wvdc	
2	1.89		
4	2.29	.02	4.98
5	2.98	12500 wvdc	
10	3.98		
15	4.98	.65	16.98
1400wvdc		2	95.00
.25	1.29	15000 wvdc	
.5	1.39		
1500wvdc		.0016	9.98
.5	1.59	25000 wvdc	
.75	1.69		
1	1.79	.00025	7.49
2	2.29	1	95.00
3	2.98	**AC RATED**	
5	3.49	**220vac/ 440vac**	
10	5.98		
2000wvdc		2	.89
.1	1.49	3	1.39
.2x.1	1.75	5	1.59
.2x.2	1.98	225vac/ 630vac	
.2x.5	.94		
.3x.1	.91	3.3	.79
.3x.25	.99	230vac/ 630vac	
3000wvdc			
.034	.49	5	1.29
.1	.64	330vac/ 1000dc	
.2	.69		
2500wvdc		1.25	.79
.25	2.29	1.5	.89
3000wvdc		1.75	.98
.1	2.49	2	1.03
.2	2.98	2.5	1.09
.3	3.49	2.8	1.15
4	19.98	3	1.19
5500wvdc		4	1.39
.2	12.98	5	1.49
7000wvdc		6	3.49
.002	1.69	8	5.49
.0075	1.98	10	6.49
1	4.49	20	9.98
7500wvdc		405vac/ 1200dc	
.03	2.98		
.05	3.49	.15	1.29
.1	5.98	600vac/ 1800dc	
10000 wvdc			
		16	6.98
		660vac/ 2000dc	
		5	6.49
		10	9.98

"TAB"

THAT'S A BUY

RECTIFIERS

30Vin/26Vout/150Ma Selen w/mtg flange, 2 units can connect in C. T. for Full Wave; 4 units usable as Full Wave Bridge. Ea. Unit, 36c; 2 for 69c; 4 for $1.00
Sensational BRADLEY Double Bridge, Balanced Current & Temp 1% from −40° to +68°C. Input to 4.5VAC. Output to 3VDC/ 75Ma. Only 98c
Full Wave Bridge Selen for relays or Pwr, Input 115 to 130 vac; Output 115vdc/40Ma Ea. 69c; 10 for $5.98
Copper Oxide V'Dair Wstghs 115Vin/30V out/100Ma 98c

SELENIUM RECTIFIERS

Volts In	Volts Out	Amps.	Each
HALF-WAVE			
18	12	.15	$ .69
130	120	.075	.59
130	120	.09	.69
130	120	.2	.98
130	120	.225	1.29
216	144	.075	1.75
FULL-WAVE CENTER-TAPPED			
36	28	.5	2.39
FULL-WAVE BRIDGE			
18	14	1.5	$2.49
18	14	3.5	3.69
18	14	6.4	4.89
18	14	8	6.98
18	14	12	7.98
36	28	1	3.69
36	28	3.5	4.98
36	28	10	13.95
53	32	.75	3.98
36	32	2	5.98
90	60	.15	2.85
130	100	1	8.98
130	120	2.4	12.79

PRECISION RESISTORS

Over 2½ Million in Stock
"TAB"—Specialists in Precision Resistors

No	Mfrs Choice—We Ship	Types in Stock	
0.116	271	1200	3100
0.42	278	1223	3163
0.425	280	1250	3289
0.607	286	1260	3290
0.7	289	1300	3333
1.03	299	1350	3384
1.3	300	1355	3500
1.78	310	1400	3509
2.8	311.5	1484	3700
3	320	1495	3730
3.83	325	1500	3760
4	330	1510	4000
4.35	340	1518	4030
5	350	1600	4200
5.025	360	1640	4250
6.25	366.6	1646	4280
6.5	370	1650	4300
7	375	1670	4341
7.8	380	1680	4440
7.9	389	1710	4444
8	392	1750	4520
10	400	1760	4600
10.38	410	1740	4720
11.25	410	1770	4750
12	414.3	1800	4850
13.52	418.8	1810	4900
14.2	425	1830	4900
14.25	426.9	1865	5000
15	437	1870	5100
15	440	1894	5210
15	450	1895	5235
15	450	1896	5270
15	460	1897	5300
19.2	470	1898	5500
20	475	1899	5600
22	478	1900	5730
23	480	1901	5770
24	487	1902	5800
25	500	1903	6000
25	520	1904	6100
26	530	1905	6120
28	540	1906	6140
31.5	550	1907	6200
37	575	1908	6300
40	580	1909	6400
48	588	1910	6500
50	600	1911	6840
51.78	612	1912	6900
55	625	1913	7000
56.7	633	1914	7320
61	640	1915	7500
63	641	1916	7700
68	645	1917	7717
71	648	1918	7900
75	650	1919	7930
80	657	1922	7980
81.4	665	1924	8000
88	668	1926	8094
89.8	670	1960	8250
95	673	1964	8300
100	675	2000	8700
101	680	2045	8770
101	681	2080	9000
105.7	684	2095	9100
107	689	2141	9445
107	697	2142	9500
121.2	699	2149	9710
125	700	2150	9800
130	711	2180	9900
133	730	2183	9902
147.5	740	2187	10000
150	750	2195	10430
160	800	2200	10500
165	806	2250	10600
180	850	2300	10900
175	854	2400	11000
179	899	2450	11000
179	900	2463	11400
182.4	910	2485	11500
200	917	2490	11500
209.4	946	2500	12000
216	976	2525	12500
220	1000	2600	12800
220.4	1030	2625	13000
225	1058	2635	13100
226	1060	2650	13500
238	1067	2750	13550
240	1100	2850	13800
248	1110	2860	14000
248.4	1150	2870	14250
250	1155	2900	14400
250	1162	3000	14500

Any size Above, Each 35c; Ten for $3.39

MEGOHMS

1.	1.87	2.25	3.673
1.1	1.579	2.5	3.75
1.2	1.65	2.7	3.9
1.25	1.75	2.75	4.7
1.5	1.8	2.8	4.23
1.35	1.9	2.855	4.25
1.39	2	3	5
1.4	2.11	3.3	6.5
1.5	2.2	3.5	6.8

Any Size Above, Each 70c; Ten for $6.49

THAT'S A BUY "TAB" THAT'S A BUY
DEPT. 4RN SIX CHURCH ST. NEW YORK 6, N.Y., U.S.A. - CORNER CHURCH & LIBERTY STS. ROOM 200

Money Back Guarantee (Cost of Mdse Only) $5 Min. Order FOB NYC. Add Shpg. Charges & 25% Dep. Prices Subject to Change Without Notice.
Phone: WOrth 2-7230.

"TAB" THAT'S A BUY

SNOOPERSCOPE

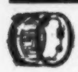
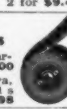


Image-Converter Tube HiSensitivity simplified design 2" dia., Willemite screen—Resolution up to 350 lines/in. Complete data & tube. "TAB" SPECIAL, each $4.98; 2 for $9.49

35mm and 16mm FILM Guaranteed Govt. Surplus



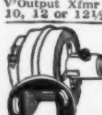
35mm Plus-X Pan 20 Exp Cartridges............5 for $1.00

16mm PAN film GSAP camera, dated, Gtd Perfect 54 rolls (1320 ft.) $5.98

NEW TV COMPONENTS

- HiV Horiz & Defl Output Xformer Sim RCA 211T5 for 15-16" Picture Tubes. $1.98
- Width Control Sim 201R4 .... .39
- Focus Coil Sim 202D2 .... 4.98
- UTC 86662 VBOXfmr H'Sld 1.69
- TV Yoke SPECIAL 2.49
- Focus Coil Magn Kineseps 2.98
- HiV Cndsr 500mmf 15KV .... .65
- JEFFERS Condsr 500mmf/20KV .... .81
- Ion Trap Magnet RCA 203D1 .... 1.49
- Ion Trap Perm Magnet type .... .98
- RCA HiV Defl Xfmr 211T1 .... 4.98
- V'Output Xfmr Sim RCA 204T2 .... 2.69
- 10, 12 or 12½ Picture Frame Mask. .59

BLOWERS
Cool That Tube!



- **40 CFM** 28vacdc...$4.98
- **70 CFM** 115v/400 cy 4.49
- **250 CFM** 28vacdc.. 9.95
- **250 CFM** & 28 to 115 vac Transformer.. 11.95
- **100 CFM** 115vacdc. 7.98
- **175 CFM** 220vac... 11.98

IN34 XTALS, 75c
10 for $7.30 / 100 for $71.00

FILTER CHOKES

- **8HY/150ma** New UTC..$1.98
- **12HY/300ma**, Csd..... 3.95
- **3HY/40ma**, Csd..3 for 1.00
- **50HY/125ma**, Csd..... 1.95
- **Dual 2HY/300ma**..2 for 1.98
- **10HY/30ma** .... .59
- **10HY/200ma**, Csd HiVinsltd........ 1.95

LINE FILTERS

- **10Amp**/130vacdc Csd USN 0.1 to 1000 Mc's........$1.29
- **30Amp**/250vacdc Csd USN 0.1 to 1000 Mc's Ea. $3.98; 2 for $6.00.
- **50Amp**/600vdc/250vac. Fltrs both sides of line. SOLAR "Elim-O-Stat." New $9.98; 2/$18; 5/$39.
- **100Amp**/usable 110 vacdc GE, SPECIAL 2 for $1.98.

FL-5 FILTER
Range or Voice, Filters 1020cyc Audio, Exc for CW work.
89c @ 2 for $1.49

BASIC PHOTOFLASH KIT

Complete Pwr Supply w/cndsrs, Lamp, data 115 VAC.....$29.95

Studio Kit Air C 1169 set 115 VAC or Batt, 2 Lamps.....$69.95

PHOTOFLASH CONDENSERS

- 15mfd/330vac/1800vdc INT $3.98
- 25mfd/330vac/1800vdc INT 6.49
- 16mfd/600vac/2800vdc INT 6.98
- **R4340 Sylvania Electro Flash.** A $57 Seller, BRAND NEW..........$36.00
- **X-400** Air Corps Lamp.......... 14.98
- **Hi-V P'Flash Pwr Kit.** Ideal 1800V Dblr Ckt: 115vac Inpt. Output 900V/35ma & 2x2.5v/2Aea wndg/4KVins Sig Cspec H'Sld PLUS 2x25mfd/90W-Sec Cndsr & Data for Flash..............$16.98
- Above w/Flash Lamp............ 28.98

NEW FLASH LAMPS

Replacement for	Each
G-E FT114	$11.79
AMGLO 5804X	11.98
AMGLO 58R4X	11.98
G-E FT110 or FT114	10.98
G-E FT403	16.98
G-E FT503	54.98
SYLVANIA 4330	12.98

TRANSFORMERS
115V 60 Cyc Input

- **TV&CR Pwr Xfmr** for 7" to 20" Tubes. Hi VOLTS to 20KV (w/quadrupler ckt). ALL Tubes, PL & FIL wndgs dlvrng: 300 VDC/275Ma Full-Wave, 6.4V/10.3A, 5.4V/8A, 2.5V/3A Hypersil Core, Oil impreg......$8.98
- **2500V for CRT**, 6.3V/.6A, 2.5V/1.75A Csd Kenyon $8.98
- **1400vct/90ma**, 6.3v/4a, 5v/3a H'sld.$5.98
- **1320V & 375VCT/110ma**, 5V/3A, 2.5V/3.25A, 6.3V/2.75A H'Sld, H.Vinsltd.$9.98
- **1000vct/150ma**, 300v Bias 6.3/5a, 5v/3a, 2x6.3v/.65a, 6.3v/1.25a H'sld......$4.98
- **1000vct/45ma**, 795vct/80ma & 360 vct/55ma, 3x5v/3a, 6.3vct/1a, 6.3vct/.3a Csd, HiVinsul $5.98
- **900v/35ma**, 2x2.5v/2a, Xcellent 1800 V' Dblr, two 2x2 fil. wndgs, H'sld HVins.$3.49
- **840vct/110ma & 530vct/21ma**, 2x5v/3A, 6.3v/1A,6.3v/.3ACsdHiVins Raytheon.$5.98
- **570V/150ma** 5v/3a, 12v/4a, H'sld..$4.49
- **420vct/90ma**, 6.3v/1.9a w/inpts 6-12-24-115vdc & 115/230vac, $1.98; 2 for $3.49
- **220v/50ma**, 6.3v/2a, 6.3v/1a, 5v/6.5a Csd HiV insul..............$1.89

PLATE TRANSFORMERS

- **7500V or 15000 V'Dblr/35ma**.....$18.95
- **3000V/10ma**, Csd HiVinsul........ 6.49
- **1800v/4ma**, H'Sld HiVins........ 4.49
- **490 & 355vct/325ma** Csd HiVins.. 4.98
- **2x330vct/10ma** (or 660vct) H'Sld.. 1.69

FILAMENT TRANSFORMERS

- **2x5V/12A** ea, Wndg/12.5Kv Ins....$9.98
- **6.3vct/4A** (gud 6.5A) H'Sld HiVins.. 2.69
- **6.3v/2A**, $1.39; **6.3v/.6A** HVins... 1.98
- **2.5v/2A**, 79c; **7.5vct/12A**........ 4.98
- **12.6vct/1.25A**, $1.98; **24v/2a** csd.. 1.98

MODULATION and AUDIO XFMRS

- **MODUL/240 Watts** Peak PP Par 807's to PP807's RF/2000 ohm Load STANCOR/USN H'Sld $6.95
- **UNIV OUTPT/12 Watts** Any Tube Any Voice Coil UTAH 5999......$1.29; 2 for $1.98
- **Line Auto Former/30W** UTC LVM-11.$3.49
- **Mike or Line to Grid** "ouncer" UTC 0-14 50:1/200 ohms to ½ meg **$13** List $2.98
- **OUTPT/300 Watts** Hi-Fi PP805 to 9 ohm VC, WEco H'Sld HiVins..........$12.98

END EQUIPMENT BUYS!

- **RADIO COMP RCVR** Less Tubes,AsIs.$ 5.98
- **EES** Tel. Incl. Handset, As Is..... 3.98
- **TG5** Keyer, As Is.............. 5.98
- **EE8** RingingGen Assy, Like New, Less Handset(TS-9),$7.98; Handset forEE8 4.98
- **R9/APN4** Receiver, Less Tubes, As Is 14.98
- **TG10** Code Unit, Less Tubes, As Is. 19.95
- **B19-M4** Variometer Unit, As Is.... 1.98
- **RM29** Control Unit, BRAND NEW.. 11.98
- **RT34/APS13** 30 Mc IF, Less Tubes, As Is 7.98
- **R59/TPS3** Good, As Is, Less Tubes. 29.98
- **EE65** Telephone Test Set, Fine Cond. 24.98
- **BE65** Time Interval Signal, Used... 3.98
- **R74/CRW** Rcvr, Less Tubes, As Is.. 2.49
- **R89/ARN5A** less tubes, CAA app.. 19.98
- **PE97** Plate Supply Unit, Less Tubes 9.98
- **I-108** Range Calibrator, Metal Case. 29.98
- **PE120** Pwr Supply, Less Tubes, Used 9.98
- **Mackay** 168B Radio Xmitter, w/Metal Case, Less Vibrapack & Tubes, As Is 2.98
- **I-198** Sig. Gen, Good Cond, Less Tubes 14.95
- **BC212** Amp, Exc Cond, Less Tubes. 1.49
- **M299** Mike Adapter, Good Cond.... .69
- **BC453** Rcvr (190-550Kc) New..... 24.49
- **BC454** Rcvr (3-6 Mc) New, Less Tubes 10.49
- **BC455** Rcvr (6-9Mc), LT*, Dyn, As Is 4.95
- **BC456** Mod, Less Tubes*, Dyn, As Is 1.98
- **BC457** Xmtr (4-5.3Mc), LT*, As Is.. 3.49
- **BC458** Xmtr (5.3-7Mc), LT*, As Is.. 3.98
- **SCR595** IFF, Less Tubes, As Is.... 3.98
- **BC602 Cont Box** for 522, As Is.... 1.29
- **BC605** Amp, Less Tubes, As Is.... 3.98
- **SCR695** IFF, Less Tubes, As Is.... 4.98
- **BC732 Rcvr**, Less Tubes, As Is.... 5.98
- **BC906** Freq.Mtr.ExcCond, Less Tubes 29.95
- **Projector Unit** US Navy BRAND NEW 1.98
- **KLAKS SPECIAL'** Brand New, for Shower or Beach. Sturdy Wood & Canvas Constr, Popular Size 10, Pair.. .39

RCA UNIV OUTPUT XFMR

10W, to 15KC. Matches ANY Line or Spkrs w/VC's 3 to 4 or 150 ohms to ANY Load & Tube IMP bet 50 & 10240 ohms. Over 1000 combinations! Acts as EXC Band Pass Fltr or Freq. Attn Unit for Dyn Mike. Cuts HI's or LOWS. IDEAL Lazy Q-5 action CWor Phone. Gets ONLY Signal you WANT to hear. W/data $1.89; 3 for $4.98.

TUBES "TAB" TESTED & GUARANTEED
(Prices Subject to Change)

- OA2 $1.69
- OA3/VR75 1.36
- OA4G 1.33
- OB2 1.70
- OB3/VR90 1.29
- OC3/VR105 1.39
- OD3/VR150 1.10
- OY4 2.53
- OZ4 .86
- C1A 4.90
- 01A .68
- 1A3 1.10
- 1A4P .98
- 1A5GT .85
- 1A6 1.78
- 1A7GT 1.49
- 1AE4 1.80
- 1B3/8016 2.65
- 1B4P .98
- 1B5/25S .98
- 1B7GT .98
- 1B21/471A 2.85
- 1B22 3.39
- 1B23 12.39
- 1B24 18.00
- 1B24 Sylv. 36.00
- 1B26 3.85
- 1B27 23.85
- 1B29 2.65
- 1B32/532A 2.98
- 1B36 10.00
- 1B37 18.00
- 1B38 34.00
- 1B40 4.95
- 1B41 49.95
- 1B42 7.50
- 1B46 3.69
- 1B53 49.95
- 1B54 79.95
- 1B56 40.95
- 1B59 12.95
- 1B60 64.95
- EL1C 3.49
- 1C5GT 1.09
- 1C6 .89
- 1C7G .98
- 1D5GP .98
- 1D7G .98
- 1D8GT .98
- 1E5GP .98
- 1E7G .98
- 1F4 .79
- 1F5G .98
- 1F6 .98
- 1F7G .98
- 1G4GT .98
- 1G5G .98
- 1G6GT 1.19
- 1H4G .98
- 1H5G 1.08
- 1H6G .98
- 1J5G 1.20
- 1J6G .98
- 1L4 .98
- 1LA4 1.33
- 1LA6 1.33
- 1LB4 1.33
- 1LC5 1.33
- 1LC6 1.33
- 1LD5 .98
- 1LE3 1.33
- 1LG5 1.41
- 1LH4 1.33
- 1LN5 .98
- 1N5GT 1.05
- 1N6G .98
- 1P5GT .98
- 1P24 2.39
- 1Q5GT .98
- 1Q26 69.00
- 1R4/1294 .98
- 1R5 1.06
- 1S4 1.20
- 1S5 .98
- 1T4 1.05
- 1T5GT 1.33
- 1U4/5910 .98
- 1U5 .95
- 1V .98
- 1V2 .70
- 1Y2 3.98
- 1X2A 2.65
- 1Z2 3.98
- 2A3 1.68
- 2A4G 1.20
- 2A5 .89
- 2A6 .89
- 2A7 .89
- 2B7 .98
- 2B22/GL559 1.38
- 2C21/1642 .36
- 2C22/7193 .89
- 2C26 .25
- 2C34/RK34 .69
- 2C39 23.98
- 2C40 4.89
- 2C43 28.50
- 2C43/464A 16.95
- 2C44 1.20
- 2C50 3.69
- 2C52 3.06
- 2D21 1.80
- 2E5 1.16
- 2E22 1.12
- 2E24 5.05

- 2E25A/HY65 5.15
- 2E26 3.85
- 2E30 2.25
- 2J21 10.69
- 2J21A 10.69
- 2J26 28.50
- 2J27 28.50
- 2J31 38.50
- 2J32 39.50
- 2J33 39.50
- 2J34 39.50
- 2J36 95.00
- 2J37 12.75
- 2J38 12.65
- 2J39 38.50
- 2J40 33.50
- 2J48 28.50
- 2J49 39.45
- 2J50 27.50
- 2J55 139.00
- 2J56 249.50
- 2J61 49.50
- 2K25 49.98
- 2K25/723AB 49.98
- 2K28/mtd 36.98
- 2K29 39.95
- 2V3G 1.29
- 2W3GT .98
- 2X2 .98
- 2X2A 1.89
- 3A4 .98
- 3A5 1.69
- 3A8GT 1.90
- 3B4 2.69
- 3B5 .98
- 3B7/1291 .69
- 3B24 6.98
- 3B25 4.60
- 3B26 3.95
- 3B27 1.95
- 3B28 7.85
- 3C6/XXB 1.60
- 3C23 5.85
- 3C31/C1B 3.45
- 3C45 13.85
- 3D6/1299 .69
- 3D21A 1.98
- 3E29 17.49
- 3LF4 1.33
- 3Q4 1.12
- 3Q5GT 1.25
- 3S4 1.05
- 3V4 1.05
- 4B27 4.95
- 4B32 11.69
- 4C25/HK54 5.98
- 4C33 59.00
- 4C35 34.90
- 4C36 15.98
- 4E27/257 17.85
- 4J31 95.00
- 4J42/700 19.00
- 4J47 260.00
- 4T4/2 5.95
- 5C22 59.95
- 5C30/C5B 9.95
- 5D21 24.30
- 5J23 13.45
- 5J29 12.40
- 5J32 99.00
- 5R4GY 2.25
- 5T4 1.98
- 5U4G 1.65
- 5V4G 2.40
- 5W4 1.35
- 5X4G .90
- 5Y3GT 1.25
- 5Y4G .75
- 5Z3 1.15
- 5Z4 1.35
- C6A 7.45
- 6A3 1.65
- 6A4 1.60
- 6A5G 3.10
- 6A6 .98
- 6A7 1.05
- 6A8GT 1.05
- 6AB4 2.00
- 6AB5/6N5 1.33
- 6AB7/1853 1.42
- 6AC5GT 1.29
- 6AC7 2.90
- 6AD7 1.60
- 6AE5 .99
- 6AE6G .79
- 6AF5G .89
- 6AF6G 1.33
- 6AG5 2.65
- 6AG7 2.88
- 6AH5G 1.49
- 6AH6 3.90
- 6AJ5 1.49
- 6AK5 3.90
- 6AK6 2.40
- 6AL5 2.00
- 6AL7GT 2.65
- 6AN5 6.00
- 6AQ5 2.00
- 6AQ6 1.80
- 6AQ7GT 1.23
- 6AR5 1.65
- 6AR6 5.49
- 6AS5 2.00
- 6AS6 3.59
- 6AS7G 6.75

- 6AT6 1.50
- 6AU5GT 2.65
- 6AU6 2.00
- 6AV5GT 2.65
- 6AV6 1.50
- 6AW6 2.65
- 6AX5GT 1.65
- 6B4G 1.98
- 6B6G .98
- 6B7 1.39
- 6B8G 1.39
- 6BA4 1.08
- 6BA5 1.98
- 6BA6 1.80
- 6BA7 1.20
- 6BC5 2.00
- 6BD6 2.00
- 6BE6 1.80
- 6BF6 1.49
- 6BG6G 2.25
- 6BH6 2.00
- 6BJ6 2.00
- 6BQ6GT 3.20
- 6C4 1.65
- 6C5GT .83
- 6C6 .89
- 6C7 1.26
- 6C8G .98
- 6C21 42.50
- 6CB6 2.00
- 6CD6G 6.00
- 6D4 2.85
- 6D6 .89
- 6D7G .89
- 6D8 .98
- 6E5 1.10
- 6E6 1.39
- 6E7 1.39
- 6F5 .83
- 6F6 1.04
- 6F6GT .85
- 6F7 1.39

- 6V7G 1.18
- 6W4GT 1.80
- 6W4WGT 2.50
- 6W5GT .98
- 6W6 2.00
- 6W7G 1.33
- 6X4 1.50
- 6X5GT 1.50
- 6Y5 1.85
- 6Y6G 1.25
- 6Y7G .98
- 6Z5/12Z5 1.18
- 6Z7G .98
- 6ZY5G .98
- 7A4/XXL .98
- 7A5 1.10
- 7A6 .90
- 7A7 1.62
- 7A8 .90
- 7AD7 1.56
- 7AF7 .87
- 7AG7 1.15
- 7AH7 1.15
- 7B4 .87
- 7B5 1.80
- 7B6 1.80
- 7B7 .90
- 7B8 .90
- 7C4/1203A .89
- 7C5 .89
- 7C6 1.62
- 7C7 .95
- 7C23 72.00
- 7E5/1201 1.25

- 12SJ7GT .89
- 12SK7 1.80
- 12SL7GT 1.07
- 12SN7GT 2.20
- 12SQ7GT 1.50
- 12SR7 .98
- 12X3 .90
- 12Z3 .98
- 14A4 1.29
- 14A7/12B7 1.08
- 14AF7/XXD 1.18
- 14B6 1.08
- 14B8 1.10
- 14C5 1.29
- 14C7 1.20
- 14E6 1.10
- 14E7 1.33
- 14F7 1.10
- 14F8 1.29
- 14H7 1.17
- 14J7 1.33
- 14N7 1.35
- 14Q7 1.10
- 14R7 1.29
- 14S7 1.33
- 14W7 1.33
- 14X7 1.33
- 14Y4 1.20
- 15 .98
- 15E 1.17
- 15R .89
- FG17 3.98
- RK18 .98
- 18 .98

- 43 .85
- 45 .98
- 45S/VT52 .69
- 45Z3 .89
- 45Z5 .90
- 46 .99
- 47 .89
- 48 3.90
- RK48A 14.85
- 49 .89
- 50 1.95
- EF50 .98
- 50A5 1.35
- 50B5 1.80
- 50C5 1.03
- 50C6* 1.49
- 50L6GT* 1.65
- 50X6 1.10
- 50Y6GT .90
- 50Y7GT .99
- 52 .99
- 53 .78
- 55 1.06
- 56 .85
- 57 .89
- 58 .89
- 59 1.78
- RK65 24.95
- HY69 2.75
- 70A7 1.59
- 70L7GT 1.95
- 71A .98
- 72 .95
- CRP72 1.37

- 250TL 21.29
- HK254 15.49
- 262A 3.98
- 262B 3.98
- 271A 6.65
- 274B/5R4 2.25
- 282B 8.49
- 300 27.50
- 304TH 24.98
- 304TL 24.98
- 307A/RK75 6.45
- 310A 6.98
- 316A 2.98
- 323B 12.25
- 327A 2.50
- 350A 8.95
- 350B 3.50
- 354A 24.98
- 355A 14.15
- HK357C 39.49
- 367A 3.98
- 371B .98
- 380A .79
- 388A 2.69
- 393A 4.98
- 394A 4.98
- X400 14.98
- WL414 63.95
- 417A 9.49
- GL434 14.98
- 446A/2C40 1.19
- 446B 1.75
- 450TH 47.50
- 450TL 44.50

- 816/866JR 1.29
- 826 .98
- SD828 .98
- 829 12.98
- 829B 14.98
- 832 10.98
- 832A 12.98
- 833A 39.98
- 836 3.98
- 837 1.39
- 838 3.98
- 842 2.75
- 843 .39
- 845 5.95
- 851 60.00
- 860 12.98
- 861 49.95
- 864 .38
- 865 1.39
- 866A 1.75
- 869 25.98
- 872A 2.45
- GE872A 4.98
- 873 15.98
- 874 1.39
- 878 1.95
- 884/6Q5G 1.80
- 885 1.80
- 893A 250.00
- 922 .98
- 923 1.75
- 927/CE25 1.00
- 929 1.33
- 930 1.05
- 931A 4.98
- HK953E 78.00
- 954 .25
- 955 .49
- 956 .39
- 957 .39
- 958A .69
- SD968 .98

Use Your Priority for SPEEDY DELIVERY—Extend Your DO & Contract Nos.

- 6F8G 1.49
- 6G6G .98
- 6H6 1.15
- C6J 6.49
- 6J4 6.98
- 6J5GT 1.50
- 6J6 2.90
- 6J7 1.20
- 6J8G 1.39
- 6K4 3.49
- 6K5GT 1.16
- 6K6GT 1.50
- 6K7 .85
- 6K8 1.07
- 6L5G .98
- 6L6 2.98
- 6L6G 1.98
- 6L6GA 1.98
- 6L7 1.15
- 6N4 2.39
- 6N6G 1.95
- 6N7GT 1.26
- 6P5GT 1.17

- 7E6 1.10
- 7E7 1.10
- 7F7 1.15
- 7F8 2.65
- 7G7/1232 1.33
- 7H7 2.00
- 7J7 1.33
- 7K7 1.33
- 7L7 1.33
- 7N7 2.65
- 7Q7 .95
- 7R7 1.07
- 7S7 1.33
- 7T7 1.03
- 7V7 1.33
- 7W7 2.65
- 7X7/XXFM 1.33
- 7Y4 .90
- 7Z4 .87
- 10Y .79
- 12A .89
- 12A5 1.39
- 12A6 .98

- 19 .69
- 19BG6G 2.98
- 19J6 3.20
- 19T8 2.90
- 20 1.17
- RK20A 9.90
- RX21 2.50
- PJ22/CE1C 1.49
- 22 .99
- HY24 1.39
- 24 .89
- 24A 1.10
- 24G/3C24 .69
- 25A6 1.20
- 25A7 3.27
- 25AC5GT 1.95
- 25B5 1.39
- 25BQ6GT 3.20
- 25C6 1.18
- 25L6GT .87
- 25N6 1.69
- 25W4GT 2.00
- 25Y5 .87

- 73 1.67
- NR74 .29
- 75 .83
- HY75A 4.59
- 76 .83
- 77 .83
- 78 .83
- 79 .89
- 80 1.19
- 81 1.95
- FG81A 3.75
- 82 1.29
- 82V 1.39
- 83 1.29
- 83V 1.54
- 84/6Z4 .95
- 85 1.10
- 89 .79
- VR92 .25
- DR100 11.49
- 100TH 8.89
- FG104 17.45
- FG105 12.95

- GL451 .89
- 460/HF200 15.95
- WL468 8.95
- RH507 9.98
- 527 35.00
- GL530 49.69
- WL531 3.75
- WL532A 3.89
- 544 4.98
- GL546 1.69
- 550P1 19.95
- 575A/975 12.65
- WL579B 12.98
- 601B .19
- HY615 .18
- WL619 18.90
- WL632A 8.98
- 702A/702B 2.65
- 703A 3.98
- 704A 1.05
- 705A/8021 .65
- 707A 13.50

- 991 .40
- FM1000 1.50
- 1000T 85.00
- CK1005 .49
- CK1006 .64
- CK1007 .89
- HK1054 130.00
- CK1089 3.98
- CK1090 2.69
- R1100 5.00
- R1130B 12.00
- HY1231Z 5.39
- HY1269 5.39
- 1273 1.15
- 1603 3.00
- 1609 5.98
- 1613/6F6X 1.25
- 1614 2.05
- 1616 1.98
- 1619 .29
- 1620 4.95
- 1621 1.29
- 1622 2.26

Top Dollar Paid for Your Surplus Tubes—Send List and Prices

- 6Q7 .98
- 6R7 .98
- 6R8 1.39
- 6S4 1.80
- 6S7 1.29
- 6S8GT 2.65
- 6SA7GT 2.00
- 6SB7Y 1.20
- 6SC7 1.45
- 6SD7GT 1.29
- 6SF5 .98
- 6SF7 .98
- 6SG7 2.00
- 6SH7GT 1.07
- 6SJ7 1.65
- 6SK7GT 1.80
- 6SL7GT 1.25
- 6SN7GT 2.20
- 6SN7WGT 2.90
- 6SQ7GT 1.50
- 6SR7 1.80
- 6SS7 .90
- 6ST7 1.33
- 6SU7GTY 3.37
- 6SZ7 1.05
- 6T7G 1.29
- 6T8 2.90
- 6U4GT .88
- 6U5/6G5 .98
- 6U6GT 1.05
- 6U7G .90
- 6V6 2.25
- 6V6GT 2.00
- 6V6GTY 2.45

- 12A7 1.49
- 12A8GT 1.00
- 12AH7GT 1.33
- 12AL5 2.00
- 12AT6 1.50
- 12AT7 2.90
- 12AU6 2.00
- 12AU7 2.40
- 12AV6 1.50
- 12AV7 2.90
- 12AW6 2.40
- 12AX7 2.40
- 12AY7 6.00
- 12BA6 1.80
- 12BA7 2.40
- 12BD6 2.00
- 12BE6 1.80
- 12BF6 .85
- 12BH7 2.40
- 12C8 1.39
- 12F5 .90
- 12H6 1.80
- 12J5GT .73
- 12J7GT 1.00
- 12K7GT .98
- 12K8 1.07
- 12Q7GT .90
- 12S8GT .98
- 12SA7GT 1.05
- 12SC7 1.39
- 12SF5GT .79
- 12SF7GT .79
- 12SG7 .89
- 12SH7 1.10

- 25Z5 .87
- 25Z6GT 1.50
- 26 .79
- 27 .75
- FG27A 8.70
- RK28A 3.85
- 28D7 1.39
- 30 .89
- 31 .59
- HY31Z 2.75
- 32 .59
- FG32 5.98
- 32L7GT 1.69
- 33 .69
- 34 1.60
- 35/51 1.00
- 35A5 .95
- 35B5 2.00
- 35C5 2.00
- 35D5 2.00
- 35L6GT 1.65
- 35TG 4.95
- 35Y4 .90
- 35Z3 .90
- 35Z4GT .75
- 35Z5GT 1.50
- REL36/6J4 .50
- 36 .69
- 37 .69
- 38 .69
- 39/44 .69
- CRC40 .54
- 41 .79
- 42 .79

- VU111 .45
- HY114B .79
- HY115/145 .75
- 117L7 1.95
- 117N7GT 1.95
- 117P7GT 1.95
- 117Z3 .79
- 117Z4GT 1.45
- 117Z6GT 1.20
- 117Z7GT 1.49
- F127A 15.89
- VT127A/100TS 3.98
- CV148 4.98
- 150T 14.50
- 155 .98
- FG166 49.00
- FG172 42.50
- 182B 1.20
- FG190 12.80
- 200 22.98
- 205B/VT2 1.69
- CE206 3.15
- 211/VT4C 1.89
- RX215 9.95
- WE215A .15
- 227A 2.65
- 231 1.20
- 242C 7.20
- 244A 4.15
- 247A 9.95
- 249B 3.75
- 249C 1.95
- 250TH 21.29

- 707B 24.98
- 710/8011 1.98
- 710A/8011 1.75
- 713A 1.00
- 715A 6.98
- 715B 9.98
- 715C 22.98
- 716A 2.75
- 717A 1.59
- 719A 22.75
- 720CY 45.00
- 721A 5.98
- 722A/287 2.75
- 723A 9.75
- 723A/B 18.98
- 724A/B 2.89
- 724D 12.98
- 725A 7.75
- 726A 7.98
- 726B 24.98
- 726C 69.98
- 730A 9.89
- 801 .89
- 803 3.00
- 804 8.45
- 805 4.98
- 807 1.98
- 808 2.39
- 809 2.45
- 810 11.95
- 811 2.89
- 812 2.85
- 813 11.75
- 815 2.98

- 1625 .49
- 1626 .49
- 1629 .39
- 1631 1.25
- 1632 .77
- 1633 .75
- 1634 1.80
- 1635 1.49
- 1641/RK60 .75
- 2050 1.80
- 2051 1.80
- R4340 36.00
- 5514 4.85
- 5516 7.75
- 5618 3.29
- 5656 9.98
- 5670 5.98
- 5686 4.23
- 5687 5.75
- 5812 2.99
- 5881 2.89
- HK5944 16.49
- HK5990 11.50
- HK5991 18.00
- 8002R 99.50
- UX6653 .69
- 8012A 1.25
- 8013A 5.98
- 8020 1.98
- 9001 1.98
- 9002 1.65
- 9003 1.98
- 9004 .79
- 9005/RC48 1.95

- 9006 .27

Sub/Miniatures

- 2E31 1.39
- 2E36 1.49
- 2E43 1.39
- CK501AX 1.26
- CK502AX 1.79
- CK505AX 1.79
- CK509AX 1.26
- CK512AX 1.79
- CK522AX 1.79
- CK525AX 1.79
- CK526AX 1.98
- CK528AX 1.79
- CK529AX 1.98
- CK531DX .98
- CK532DX .98
- CK533AX 1.39
- CK534AX .89
- CK536AX .89
- CK537AX 4.98
- CK538DX .89
- CK539DX .98
- CK541DX 1.98
- CK542DX .98
- CK543DX .98
- CK544DX .98
- CK546DX 1.98
- CK547DX 1.98
- CK548DX 1.98
- CK551AXA 1.69
- JRP5676 1.49
- CK5678 2.48
- CK5697 5.98
- CK5702 5.98
- JR5704 5.79
- CK5744 2.98
- 5829 5.98
- 5875 1.98

C'Ray Tubes

- 2AP1 6.98
- 2AP5 7.98
- 3BP1 2.49
- 3BP1A 14.98
- 3CP1-S1 2.85
- 3DP1 4.85
- 3DP1-S2 8.85
- 3EP1 5.85
- 3FP7 3.85
- 3FP7A 14.98
- 3GP1 4.89
- 3HP7 3.85
- 3HP14 14.98
- 3JP1 15.00
- 3JP7 7.95
- 3JP12 19.95
- 3JP14 16.95
- 4AP10 4.85
- 5BP1 6.98
- 5BP4 6.98
- 5CP1 4.85
- 5FP7 1.85
- 5FP14 18.98
- 5HP1 9.75
- 5HP4 9.75
- 5JP2 24.75
- 5LP7 19.98
- 5MP1 9.75
- 5NP1 5.85
- 7BP1 4.95
- 7BP7 8.85
- 7CP1 12.95
- 9GP7 14.89
- 9JP1 14.85
- 9LP7 14.85
- 10BP4 19.49
- 10BP4A 27.48
- 10FP4 24.50
- 12DP7 12.45
- 12GP1 49.98
- 12JP4 27.00
- 12KP4 47.00
- 12LP4 24.35
- 14BP4 27.98
- 16HP4A 43.98
- 16KP4 47.29
- 16LP4 36.98
- 16MP4 43.98
- 16RP4 39.98
- 16TP4 39.98
- 16YP4 43.98
- 17BP4 43.45
- 19DP4A 67.65
- 20CP4 75.35
- 905 2.45
- 912 89.98
- 914 45.00

Vacuum Capacitors

Mmf-Kv	Ea.
6-20	15.98
12-20	15.98
25-20	15.98
50-20	15.98
75-20	19.00
100-20	19.00
6-32	18.75
12-32	18.75
25-32	18.75
50-32	18.75
75-32	22.75
100-32	22.75

Tungar Bulbs

- 20X672 2.95
- 859483 3.98

Ballast

- 1P1 .49
- PM3 .98
- PM4 .98
- 4A1 1.29
- PM5 .98
- 6-11 .49
- PM6 .98
- PM7 .98
- PM8 .98
- 9-3 .49
- 10-48 .49
- 13-4 .49
- 20-4 .49
- K49A .36
- K55B .36
- M55B .36
- L62A .49
- K80B .36
- WL121A 2.61
- C376 2.98
- ZB583 3.98
- 876 .29

Mazda Pilots

- 44, Box 10 .50
- 49, Box 10 .60
- 55, Box 10 .50
- 64, Ea. .07
- S6/T4/3W .18
- 100W/20V .25
- 291, Bx 10 .36
- 311/28V .15
- 313/28V .15
- 323/3V .25

Sylvania

- S6/6W/120V .15
- Wstghs C7/7W/120V .15

MedScrewBase

- 15W/125V .08
- 25W/125V .08

Neon Bulbs

- NE15/991 .40
- NE32 .35
- NE45/2W .27
- NE51/NE20 .10

Bull's-Eye Lite Dialco Type Chromed Less Bulb .59; 2/.98

Tel Slide Lamps 6/12/24/48/55V. Ea. .18

Xtal Diodes JAN

- 1N21 .89
- 1N21A 2.00
- 1N21B 4.95
- 1N22 2.00
- 1N23 1.29
- 1N23A 3.98
- 1N23B 5.95
- 1N25 7.45
- 1N26 5.20
- 1N27 3.50
- 1N29 3.50
- 1N32 18.00
- 1N34 .75
- 1N35 1.95
- 1N46 .89
- 1N48 .70
- 1N51 .70
- 1N52 .95
- CK705 .77
- CK706 .54
- CK707 1.80

Thermistors

- D167019 Vol Limiter 2.95
- D168391 Thermal Comp 1.00
- D170396 HF Pwr Meas. .90
- 1C Bulb Time Delay .90

Varistors

- CW20259/USN 38C 2.95
- WEco 40A 1.50
- WEco 41A 1.50

Xtal Freq Studs

- 200Kc 3.98
- 1000Kc 3.49
- 4700Kc .98
- 5000Kc 3.98

HtrOvenXtals 5010/5025/5055 Kc. Ea. 14.98

Tubes Gtd Exc Open Fil & B'kage Via R'Exp Only.

THAT'S A BUY "TAB" THAT'S A BUY

DEPT. 4RN SIX CHURCH ST. NEW YORK 6, N.Y., U.S.A. - CORNER CHURCH & LIBERTY STS. ROOM 200

Money-Back Guarantee (Cost of Mdse) On $5 Min. Order FOB NYC. Add Shp Charges & 25% Dep. Prices Subject Change Without Notice. Phone: WOrth 2-7230.